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SINCE the supreme court has upheld the constitutionality of the corporation income tax law, we may expect to have considerably more publicity given to the affairs of corporations. It can make no difference with the accounts of railway corporations, since these already have about as much privacy as the life of Louis XIV, but with a corporation such as the Standard Oil Company, for instance, the new law, which among other things provides that a stockholder may have access to the returns made to the tax commissioner, should throw a good deal of light on the business methods of these corporations, which heretofore have been known exclusively by a few insiders. While presumably the supreme court did not bother itself with details of how the new law was to be administered, it would be rather interesting to know how carefully the secretary of the treasury is carrying out the strict letter of the law and how far he finds it impossible to do this, and therefore makes rules for his own guidance. The added expense to the railways is comparatively slight. Railway taxes have increased from \$245 per

mile in 1899 to \$401 per mile in 1909, or 64 per cent., and the additional increase imposed by the new law, in the face of such large increases, is simply an additional annoyance rather than a serious hardship.

"THE law," someone has said, "is the last interpretation of the law given by the last judge." Similarly, what is "reasonable" in legislation affecting railways is what is held to be so by the last court in its last decision. The supreme court of Kansas has rendered a decision upholding as reasonable a law of that state which few students of railway affairs would accept as such if the august court had not so determined. In 1905, the Kansas legislature fixed "single line" and "double line" rates to be charged on shipments of oil, the former in each case being lower for a given distance than the latter. For example, the single line rate for 6 miles or less is 2½ cents per 100 lbs.; the double line rate, 4 cents; the single line rate for 50 miles and over 40 miles, is 5½ cents; the double line rate, 7 cents, etc. The rates are the same *per pound* regardless of weight; for example, a 10-lb. can of oil takes the same rate *per pound* as a 100-lb. can, or as a tank carload. The universal rule of rate-making is to apply a minimum charge, which is the same for 100 lbs. or any less amount, and to make a distinction between shipments in carloads and less than carloads. The principal reason for making these distinctions, of course, is that it costs more per pound or per ton to haul a small shipment than a large one. It seemed reasonable to the traffic men and lawyers of the railways affected by this legislation to construe single line as one line, and double line as two lines, and, when a shipment moved over three lines, to charge the sums of the double-line and single-line rates; when it moved over four lines to charge the sum of the double-line rates, etc. But when the law was tested in the Kansas courts, they held that the making of the same rates per pound, regardless of weight, was reasonable, and that double line meant any number of lines exceeding one. Under the law as thus interpreted, the shipper can route freight through whatever junction points, and over whatever number of railways, that will enable him to get the lowest combination rate, and it often happens that a consignment of trifling weight and yielding insignificant revenue is routed over six or seven roads. For example, there recently was forwarded from Neodosha, Kan., to Haddam, a tank car containing 47,694 lbs. of gasoline. It was routed from Neodosha to Fredonia, 13 miles, via the 'Frisco; from Fredonia to Emporia, 74 miles, via the Santa Fe; from Emporia to Junction City, 62 miles, via the Missouri, Kansas & Texas; from Junction City to Clyde, 56 miles, via the Union Pacific; from Clyde to Concordia, 15 miles, via the Missouri Pacific; and from Concordia to Haddam, 31 miles, via the Burlington. From the transaction the 'Frisco earned \$2.55; the Santa Fe, \$14.77; the Missouri, Kansas & Texas, \$12.37; the Union Pacific, \$11.17; the Missouri Pacific, \$3, and the Burlington, \$6.22. In moving 251 miles the car had to be switched to and from the tracks and trains of six different railways; and the total revenue received from this very expensive haul was \$50.08, or but 8 mills per ton per mile! The agent of the Missouri, Kansas & Texas, recently was offered a shipment of 40 lbs. of oil, routed via the Katy from Chanute to Eldorado, via Pickway and the Missouri Pacific, a distance of 98 miles. The double-line rate between these points is 8½ cents per 100 lbs., so the revenue of the roads from the shipment would have been just 3 cents. The shipper, under the law, could have tendered the 40 lbs. of oil in a tank car and compelled the roads to transport it 98 miles for a little more than the price of a postage stamp! That the Kansas court, in view of the absurdities and injustice that the law in question results in, could hold it "reasonable" and constitutional, illustrates the fact, that common legal sense does not always influence courts in determining which is reasonable.

TRACK SCALES.

IN the general improvements in methods of measurement the railways have kept pace with industrial establishments. It is a remarkable fact, however, that the instrument used in weighing heavy and bulky commodities in carload lots, from whose transportation a large part of the railways' total earnings are derived, is notoriously inexact. Track scales are a development of the simple system of light levers which is employed in weighing wagons. In adapting this mechanism to the heavier requirements of the railway business, the makers have produced a scale that may answer for low capacity cars, but which in several respects has not been adequately developed with the increasing weights of cars and lading. In designing the mechanical part of track scales, and in constructing their foundation, and wooden parts, the roads usually have simply followed the traditional plans. The consequence is that as a means of weighing the larger cars with their heavy loads the scales are apt to be found defective and inadequate. The Minnesota Railway Commission says in its recent annual report that a scale expert inspected all the track scales in the state, 128 in number. Of these 37 were found to work correctly; 66 to weigh less than standard, and 25 more than standard, by substantial amounts. Eight were found to be broken; 10 to have poor foundations; on 20 the levers were shifted; 15 had worn out pivots; and binding impaired the accuracy of 23.

The principal defects in track scales are due to poor foundations which cause the main bearings to rest unevenly, thus placing irregular stress on, and causing twisting of the levers. The use of timber for the principal longitudinal members and main frames has been continued under loads which are too heavy for such material, and there is certainty of decay in a short time, so that the wooden structures do not have the required stability or permanence. The levers, although apparently heavy and stiff enough, have been found to deflect a sufficient amount to prevent correct registration of the load. Even pivot bearings as ordinarily made are often found worn out and not in true adjustment. One of the worst features of the usual track scale construction is the introduction of the permanent third rail. This requires columns to project through the main scale structure, preventing the best lever arrangement and seriously interfering with the proper inspection of the lever bearings. These and other defects have contributed to the unsatisfactory condition of track scales and prevented the weighing of cars and their lading with accuracy.

During the past two or three years the Pennsylvania Railroad has made a careful investigation of scales as usually constructed to ascertain their principal defects and how they could be overcome. The chief scale inspector, with the assistance of the mechanical engineer's department, has made some notable improvements, involving the introduction of several novel and interesting features.

We illustrate elsewhere in this issue one of the new scales recently installed at Brownsville Junction, Pa. A comparison of this substantial machine with the scales usually found on railways is instructive. The massive foundations and pit walls are of solid concrete. The third rail has been omitted and a system of toggles operated by a torsion shaft and air cylinders relieves the bearings of load and shock when they are not required for weighing. The only wood used is that for the cross ties, and the main scale frame is built up of heavy eye beams which insure a permanent construction that will remain in alignment for years, instead of requiring constant inspection and repairs; and there is no deflection to interfere with the accurate operation of the levers. The levers have been redesigned and made larger and heavier, and careful attention has been given to the design and making of the knife edges and their bearings. The weight and cost of this new and improved track scale may be regarded as excessive and unnecessary, but as it is the chief instrument for determining the amount of money that should be received for the transportation of freight in car loads, true economy requires whatever expenditure is necessary to secure the greatest accuracy in its operation.

DELAWARE, LACKAWANNA & WESTERN.

THE Delaware, Lackawanna & Western would not have made much of a showing in an argument for increased rates based solely on the need for additional profit, but Mr. Truesdale's objection to the testimony presented to the Interstate Commerce Commission in regard to efficiency of railway managements is certainly well taken. He pointed out that the D. L. & W. handled 60 per cent. more tons of freight in 1910 than in 1900, and handled 80 per cent. more tons one mile. The road handled 80 per cent. more passengers in 1910 than in 1900, and 77 per cent. more passengers one mile. This service was rendered with an increase of 5 per cent. in freight train mileage and 8 per cent. in passenger train mileage. The increase in tons handled per freight train mile was 74 per cent., the earnings per freight train mile 65 per cent., and per passenger train mile 60 per cent. Mr. Truesdale says: "Operations of the government in any branch in this country cannot show such progress in efficiency . . . Surely it is time that the people of the country should insist upon their representatives in congress, the legislatures, and elsewhere turning their attention to the question of producing greater efficiency and the reducing the profligate waste in administering the affairs of government, that the enormously increased burden of taxes paid more or less directly by the people may be reduced as it can and should be."

The Lackawanna as has often been pointed out before, is a unique railway company in a number of different respects. It owns larger anthracite coal fields, situated nearer tidewater, than those of any other large railway company. Since the charge for hauling coal from the mines to tide water must be the same, whether the haul be long or short, the Lackawanna receives a high ton mile rate. It is a company without bonded debt, and with a very low nominal stock capitalization. Its earnings, therefore, expressed in a percentage on par value of capital stock, are very high as compared with other railway companies. In 1910 it paid its regular 10 per cent. dividend and its regular extra 10 per cent., a total of 20 per cent.

The total operating revenue amounted to \$36,050,000, in 1910 an increase of \$1,200,000 or 3.56 per cent. over 1909. The total operating expenses amounted to \$20,600,000, an increase of \$1,900,000, or 10 per cent. Thus the company operated on a 57.20 per cent. ratio last year, as against 42.80 per cent. the year before.

The following table gives the unite cost of maintenance of equipment:

	1910.	1909.
*Repairs of locomotives.....	\$1,820	\$1,732
Repairs of passenger train cars.....	614	601
Repairs of freight train cars.....	53	52

*For repairs only, no account being taken of renewals, depreciation or overhead charges.

The "additional income" amounts to \$4,500,000 in 1910 as compared with \$8,500,000 in 1909, and after the payment of fixed charges and dividends and a charge of \$2,500,000 for renewals and betterments, the company had a surplus of \$4,700,000 in 1910 as against \$10,100,000 in 1909. The substantial decrease in "additional income" was due to the fact that in 1909, the profits, amounting to \$2,500,000, from the sale of Lehigh Valley stock were included in additional income, and also to the fact that the coal department earnings were less in 1910 than in 1909.

The Lackawanna owns and operates its own coal mines, and until the Commodities Clause was passed as a law it also sold its own coal at tidewater. After the Supreme Court had upheld the Commodities Clause the Lackawanna formed the Delaware, Lackawanna & Western Coal Company, distributing the coal company's stock to its own stockholders, and the coal company now buys Lackawanna coal at the pit's mouth. In 1909 this arrangement had only been in effect during five months, so that during the other seven months the profits from the sale of coal were included in the Railroad company's additional income. In 1910 the Railroad company mined about 373,000 tons more coal than during 1909, the cost per ton of coal produced being slightly more than during the preceding year.

The traffic statistics of the Lackawanna show general prosperity in the coal trade as well as in the general business of the territory which the road serves. The total number of tons of coal carried one mile amounted to 1,681,000,000, a very slight increase over 1909, while the total number of tons carried showed a decrease and the average rate per ton per mile also showed a decrease, being 8.37 mills in 1910 as against 8.61 mills in 1909. This decrease in ton mile rate with an increase in average length of haul illustrates the point previously mentioned in regard to the rate on coal being a flat rate, regardless of the number of miles carried.

The total number of tons of merchandise freight carried one mile was 1,788,000,000 in 1910, an increase of 9.88 per cent. over 1909, while the total number of tons carried increased 14.46 per cent., the average haul being 6 miles less last year than the year before, and the average rate per ton per mile being 6.96 mills in 1910 as against 7.00 mills in 1909.

Passenger traffic as well as merchandise freight traffic showed an increase in 1910. There were 26,000,000 passengers carried, an increase of 1.28 per cent. over 1909. The average distance each passenger was carried was 19 miles, and the average receipts per passenger per mile were 1.454 cents in 1910 and 1.385 cents in 1909. It will be recalled that during the year the Lackawanna made increases in its commutation rates in and out of New York. The Lackawanna spent a considerable per cent. more for traffic expenses, that is for soliciting freight and passenger business last year than it did the year before; and the substantial gain in merchandise tonnage may be, and probably, is in part due to the greater activities of the traffic department. In 1910 the company earned \$854,000 from the transportation of milk, an increase of \$58,000 over 1909; and the president's report commenting on this fact, says that it demonstrates that this branch of the company's traffic is capable of further development.

The Lackawanna is a road that has not only succeeded in actually giving a high class of service to its patrons, both to the traveling public and to shippers, but has succeeded to an unusual degree in convincing the public that this is a fact, with the consequences that it has an unusually loyal set of patrons. The annual report lays special stress on the high standard of upkeep, which has been adopted for the company. In laying new rails and ties the most modern methods of construction were followed as respects the use of heavy tie plates and screw spikes, at a largely increased cost for both labor and materials used. The report says that the standards adopted by the management as to track construction will, it is believed, within a few years result in the company's tracks being brought to a condition equal in every way to those of any railway in this or any other country. It is interesting to note that through expenditures made last year for the construction of new telephone train despatching lines the work of this character on all the main lines and branch lines of the company has been completed.

Mr. Truesdale says the "condition and outlook for the anthracite coal industry as a whole seems to be most satisfactory . . . the general business conditions remain good throughout the entire country, and the outlook for the year 1911 indicates with reasonable certainty that in all lines of activity the volume of business will continue on as large a scale at least as during the year just closed. The probabilities favor a further increase . . ."

The results of operation of the D. L. & W. for 1910 as compared with 1909 are as follows:

	1910.	1909.
Average mile operated in.....	957	957
Coal freight revenue.....	\$14,067,778	\$14,464,221
Merchandise freight revenue.....	12,443,473	11,393,860
Passenger revenue.....	7,290,943	6,825,430
Total operating revenue.....	36,052,932	34,815,011
Maintenance of way and structures.....	3,804,932	3,298,389
Maintenance of equipment.....	5,034,605	4,797,073
Traffic.....	716,347	651,888
Transportation.....	10,379,455	9,340,845
Total operating expenses.....	20,623,448	18,743,509
Operating income.....	14,121,315	15,039,687
Gross corporate income.....	18,669,311	23,513,595
Net corporate income.....	13,264,101	18,078,650
Renewals and betterments.....	2,542,117	2,099,454
Dividends.....	6,028,800	5,831,586
Surplus.....	4,693,184	10,147,609

THE FUTURE OF THE RAILWAY WAGE EARNER.

WHATEVER may be the doubts as to the influence of various forces in decreasing the net earnings of the railways, there will be accord as to the major cause. Considerable stress will be laid on such elements as the increased cost of railway supplies, the public demand for facilities and other factors. But the wage question and its collateral problems stand out by themselves. Nor is that question a simple one expressed in the mere sum total of the millions of dollars that show the wage increases. It is complicated by the continued and increasing assertiveness of labor; by its successful demand for shorter hours and more limited runs; and its resistance to piece work and its diminished efficiency due to that and other causes, with reliance on the union replacing loyalty to the corporation and responsibility to the operating manager. Not the least suggestive of the comments of some of the leading railway heads on the recent rate decisions has been their opinion that, had higher rates been granted, organized labor would ere long have tried to absorb them.

As the case stands the situation in regard to the future of the railway wage earner is economically a very interesting one. While it cannot be stated positively, there are the strongest indications that the upward wage movement has reached the summit of its curve. Earnings of the railways, save in a very few and exceptional cases, can stand no further wage increases, which during the calendar year 1910 are estimated at a minimum of \$100,000,000 to which are to be added other millions since the opening of the present year. The tendency on the other hand must be toward getting more work done for a dollar. It will take the shape which the railway managers had about agreed on early in 1908, when the Roosevelt letter to the Interstate Commerce Commission interfered—namely the normal all-round wage reductions of a post-panic year. Or it will take the alternative form (and has already in some cases) of the 1908 reduction of force and the translation of reduction of pay into reduction of the number of men on the payroll. Operating in the same direction is the important element of cost of living, on which the demand for increased wages has been successfully based. Cost of living has not yet very palpably or practically gone down. But, like wages, it has apparently reached its highest curve. Some commodities are actually lower and there are signs as to others. The magnitude of the question in politics and its dominance in the Canadian agreement are indications not to be ignored. Nor to be disregarded are the forecasts of our best economic prophets who tell us that two changes—liquidation of labor and liquidation of commodities—are necessarily ahead before the bed-rock of solid prosperity is reached and the strong reaction upward is begun. If their prognosis is correct, the responsibility for peaceful or violent readjustment of railway conditions will rest with the wage earner. Two phases of such a possible readjustment, whether it is far or near, attract speculative attention. Hitherto the policy of the unions has been the acceptance of arbitration in labor disputes. To a certain degree it has been a cheering sign as avoiding the sinister and calamitous alternative of the strike. The unions have, as a policy, opposed the theory of compulsory arbitration, but voluntary arbitration they have usually not merely accepted but have urged as a policy. But it has been arbitration on an *ascending* wage scale—arbitration not for a decrease but for an increase, and where, at the worst for labor, the old wage would stand. Suppose, however, the revised conditions in which, owing to lowered cost of living and other relevant causes, the railway corporation appeals to arbitration for a *decreased* wage. Will the unions then accept the old fashioned dictum that it is a poor rule that does not work both ways, and be as hospitable to arbitration downward as they have been to arbitration upward? And, as the second phase of the situation, will they go a step further and accept the maxim that wages, high or low, are not money and its denominations but what the money buys? Will the railway wage earner recognize the fact that the \$2.50 a day that buys more is higher pay than the \$3.00 a day that buys less?

Coming down to actual figures, the best returns available,

those of the Interstate Commerce Commission, indicate that wage increases on the railways have even now outrun the cost of living.

For the ten years which ended in 1908 the pay of engine men had increased 20 per cent.; of firemen, 25 per cent.; of conductors, 22 per cent.; and of trainmen, 34 per cent. To these wages, at a very moderate estimate, 10 per cent. would have to be added for increases since 1908, especially if shorter runs and hours be counted, though saying nothing of lowered efficiency. The campaign of higher costs of living are much more difficult, owing to the variation of prices in different regions of the country, and the varying amounts in which different articles enter into consumption. But the best estimate based on both prices and consumption in a recent arbitration indicated a rise during the last year of somewhat less than 19 per cent. Taking the returns comparatively, there can hardly be the slightest doubt that railway wages have gone above costs of living during the last ten years. If now those costs are to recede, the logic and consistency of the railway wage earner will be put to a severe test should arbitration downward be rejected after the benefits of arbitration upward had been welcomed and received. It may not come to that. It is not impossible that the railways, after their trying experiences with labor during the last two years, may, even on a descending scale of costs of living, sacrifice logic to peace. But the outlook has contingencies which make the future attitude, action and policy of the railway labor organizations a matter of extreme import. If not a prime solvent or marplot, as the case may be, of the railway problem, it has in it a most conspicuous place.

NEW BOOKS.

Comparative Analysis of Railroad Reports for the fiscal year ended June 30, 1910. H. H. Copeland & Son, New York. Ten charts bound separately in folders 10 in. x 5½ in.; published annually.

As a general rule, any manual of railway statistics contains an abstract of figures published by the railway companies, with possibly certain derived figures added; as, for instance, the figures worked out on a per mile of road basis. These analyses of railway reports are in no sense abstracts, and in the case of nearly every road covered there are figures given in the charts which cannot be derived from the annual reports of the railway companies. Each folder contains two charts, one showing the income, the expenditures, and the profit and loss accounts of about 15 roads in the same general geographical territory, and in addition there is a column showing the average for the roads in that group. The second chart shows the balance sheet figures in the form prescribed by the Interstate Commerce Commission for each of the roads, the capital changes during the year, and a group of physical statistics selected with care. No matter how familiar a man may be with the returns made by railways to their stockholders, when he comes to compare these statistics with the returns to the Interstate Commerce Commission he encounters a great number of difficulties. In the first place, roads like the Pennsylvania and the New York Central report to their stockholders for the calendar year, and to the Interstate Commerce Commission for the fiscal year ended June 30. The analyses of railway reports have been made up both from the annual reports of railways and from the returns to the Interstate Commerce Commission, but they have been carefully and intelligently readjusted so as to show figures for all roads on the same basis, and show all roads for the fiscal year ended June 30.

It is hard to do full justice to as careful a piece of analytical statistical work as these charts show in the space of a single review. Under income the total revenue from operation is shown, both as a total figure; as per mile of road operated; per revenue train mile; passenger, freight and average; per ton mile; per passenger mile, and as a per cent. of operating revenue. Freight and passenger, etc., revenue is shown on the same basis. Under expenditures, expenses of operation are shown as

a total and are divided into a number of very interesting and illuminating separate accounts. For instance, the total cost of labor is shown as a total and on per road miles operated, a per train mile basis, and as a per cent. of operating expenses, and also per mile of all tracks and sidings, excluding trackage rights. Under physical statistics, to mention but a few, there are figures showing the miles of straight line and per cent. of total and miles of level line and per cent. of total, average weight of rails per yard, miles ballasted and per cent. of total, average age per unit of each class of equipment, and the principal commodities carried, with their density.

The charts are in no sense a work of handy reference. An expert statistician might, with the expenditure of a very considerable amount of time, make such an analysis of one road as is given in these charts, providing he could have access to all the figures furnished the Interstate Commerce Commission. Naturally such an analysis as this can only be used to advantage by some one who is thoroughly familiar with the use of railway accounts. To such a one it is of the very highest value. Any comparisons made between different roads are apt to be misleading unless full allowance is made for their limitations, but such a comparison as is made in these analyses, when taken intelligently, has great instructive value.

Letters to the Editor.

ONE OF THE COMMISSION'S ARGUMENTS.

NEW YORK, March 4, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I note your reference to \$57,000,000 of New York Central stock having been issued without payment, and the intimation, at least, that dividends thereon could hardly be expected.

Is this old stock watering of 1869 to hang over the road indefinitely, like William H. Vanderbilt's celebrated sentiment? Presuming there was such a stock watering as you mention 42 years ago, has not much more than \$57,000,000 of the stockholders' money been put back into the road in the intervening years in the shape of payments from surplus? If such is the case, it constitutes a legitimate solidification of the water, so-called, and dividends on the amount thus plowed into the property are in order. Not long ago the Ontario & Western management—very reputable and conservative people—not only took credit for surplus earnings invested, but issued bonds against such investment.

So why not say a word of favorable comment concerning the New York Central episode of 1869? Yours truly,

F. W. SAWARD,

General Manager *The Coal Trade Journal*.

[The reference that Mr. Saward refers to was an abstract of Interstate Commerce Commissioner Prouty's opinion in the eastern rate case, and the reference was just about in Commissioner Prouty's own words. The argument of the commission was that on an average about 6 per cent. had been paid on New York Central stock since 1869, and this is not far from right as given in Poor's Manual; and that therefore the money that according to Mr. Saward had been plowed back into the property was not stockholders' money primarily, but money earned through presumably excessive freight rates; in other words, that the surplus earned and put back into the property was in the nature of a tax on the general public to pay off the debt of the incorporators of the company to the property. Our opinion as to the soundness of the commission's argument has been stated elsewhere, since it was not possible to publish the full opinion of Commissioner Prouty in these columns, we state his argument as we understand it. From the point of view of the stockholder, there is, of course, no doubt that long ago all of this water has been solidified.—EDITOR.]

NORTHUMBERLAND FREIGHT CLASSIFICATION YARD; PENNSYLVANIA RAILROAD.

BY WILLIAM FORSYTH.

Associate Editor, *Railway Age Gazette*.

The movement of freight traffic on the Pennsylvania Railroad from western Pennsylvania to the southern portion of the state and to New England has in recent years been more and more diverted from the main line to the Williamsport division, and this passing to the terminal at Sunbury, which is congested with traffic from four other divisions, has made it necessary to build a large classification yard at Northumberland, Pa. In the construction of this yard, which is almost completed, advantage has been taken of the experience of the Pennsylvania Railroad in building and operating several large classification yards and locomotive terminals, and the Northumberland yard is interesting as embodying the results of the careful study of these and of classification yards of other railway systems. This relates not only to the size and arrangement of tracks in the different yards, but to the design and construction of the various buildings required. The study of traffic conditions in the neighborhood of Sunbury,



Large Culvert Crossing the Yard Between the Engine House and the Coal Wharf.

Pa., was an obvious preliminary, as it was found necessary to transfer the classification yards bodily from Sunbury to Northumberland.

The freight traffic at Sunbury now requires the handling of a maximum of 4,000 cars daily, and two separate yards are used—one at the north end of the town and the other at the south end. The space at each yard is contracted and the operation of the two separate yards is unusually expensive and inconvenient. Sunbury is a natural location for a freight terminal, so far as direction and density of traffic are concerned, but space for a large yard with tandem tracks is not available. Three divisions of the Pennsylvania Railroad and two of the Northern Central concentrate at this point: the Williamsport, the Lewiston and the Sunbury divisions of the Pennsylvania Railroad; and the Susquehanna and the Shamokin divisions of the Northern Central.

The number of cars passing through the yard at Sunbury in 1900 was 804,000, or an average of 2,203 for each day in the year. The normal movement is now about 3,500 cars per day or 85 trains, the passage of a car into and out of the yard being considered one, and not two cars.

In order to provide better facilities for increased traffic, three locations were considered: first, an extension of the present

yards at the south end of Sunbury; second, Augusta, on the opposite side of the Susquehanna river, about two miles farther south; and, third, a tract on the west branch of the Susquehanna river at Northumberland. To determine the best location from an operating standpoint, the traffic was analyzed to find the average daily reverse movement for each location for 3,500 cars, which is the average maximum movement. The result of this analysis, showing the percentage of the entire movement going to and coming from each of the radiating roads, was slightly in favor of Northumberland. The probabilities of changes in the routing of traffic which would affect reverse movements were also considered. There are four things which may affect these movements: first, through freight in either direction now routed over the low grade line between Pittsburgh and Harrisburg may be sent over the line by way of Red Bank, Driftwood and Sunbury at such time as the Enon line may be built for traffic to and from the west which is now going through the Pittsburgh district; second, traffic from the middle division, which formerly moved over the high grades of the Lewistown division, is now routed via Tyrone and the Bald Eagle Valley branch to foreign line connections at Wilkesbarre and Mt. Carmel, and comes into Sunbury from the west; third, through trains between the anthracite coal region and Harrisburg may be established when the volume of business warrants; fourth, the anthracite coal movement on the Sunbury and Shamokin divisions westward over the Williamsport division is growing.

In regard to the first and second items, the yard at Northumberland would be in the line of direct movement for the traffic, while the one at East Sunbury or Augusta would produce reverse movements. The third item relates to through coal trains between Harrisburg and the anthracite coal region at Shamokin and Nanticoke. This movement will be taken care of by the retention of a few sidings in the old yard south of Sunbury, thus avoiding backward movements in the Northumberland yard. The fourth item relates to the increase of westbound anthracite shipments. This business will be in direct movement through the Northumberland yard, but would be reverse for the other two locations.

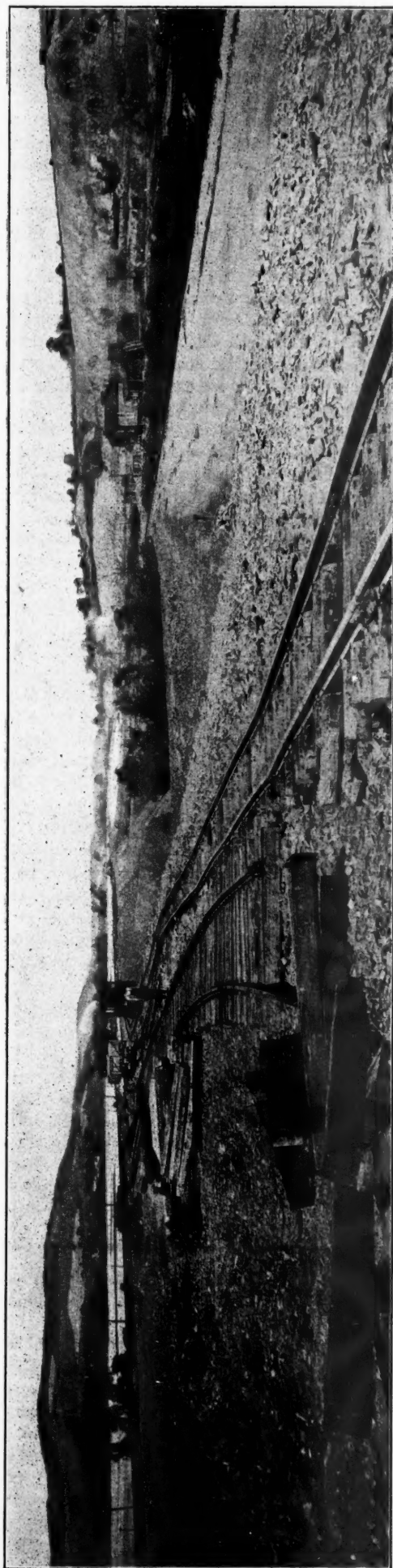
It was decided that the cost of building a yard at Northumberland would be less than at either of the other locations considered, the figures for grading, tracks and buildings at that point being approximately \$2,800,000; land, \$200,000, including the cost of a new connecting curve with the Sunbury and Wilkesbarre division, on the east side of the north branch of the Susquehanna river, and a new one connecting with the Bloomsburg division of the Delaware, Lackawanna & Western, on the west side of that branch.

PLANS AND GRADING.

In the preparation of plans for the Northumberland yard, the necessity of departure yards and the proper length of classification yards were thoroughly discussed, and it was finally decided to use the departure yards, and that classification yards need be only of an average length of 35 cars. It is believed that in addition to other reasons, a departure yard is necessary in order to properly comply with the laws relating to safety appliances, and especially the testing and inspection of air brake fixtures. The loaded car movement in both directions exceeds the empty car movement.

The photographs show the general contours during the grading period. The tract selected occupies the former level of farm lands along the west branch of the Susquehanna river, about 3 miles long, having a maximum width of 1,500 ft., and comprising 350 acres. The portion farthest from the river extends into a ridge which provided ample material for filling and raising the general level well above the river flood heights. The yard will be graded for 100 miles of track, but only 75 miles will be laid at present. These are shown in full lines on the plan, while future tracks are indicated by dotted lines.

The work was begun in July, 1909, and in 14 months 3,000,000 cubic yards of earth and rock cutting had been handled. It is



Northumberland Yard; Looking North from the Hump over the Circular Track.



Northumberland Yard; Looking North-west from the Hump Approaching the West-bound Classification Yard.

expected that the yard will be fully completed and in operation by May, 1911. The contractor for the grading and concrete foundations, culverts, etc., was the Eyre Shoemaker Construction Co., Philadelphia, Pa.

The first work consisted in transferring the main tracks, which occupied the middle of the tract, to a high bank along the river. This fill, about 45 ft. high and 3 miles long, was raised from the river bank and made ready for trains in three months. The tracks are ballasted with material from the old blast furnace slag banks at Bellefonte. Yellow pine ties have been used, and the partly worn rails from the main track are here utilized in the yard sidings, except at switches and turnouts.

Near the center of its length, between the engine house and coal wharf, the yard is crossed by a concrete culvert 12 ft. wide; a finished portion of this is shown in a photograph. Further provision is made for carrying off storm water from the neighboring hillsides by three other concrete culverts 4 ft. wide; their location is indicated on the plan view. Referring to the plan of the yard, it will be seen that it begins directly at the junction of the north and west branches of the Susquehanna river, with the initial interlocking tower at the east end, directly opposite the passenger station. Here the main line tracks diverge, the westbound passing along the extreme west side of the yard and the eastbound on the high embankment along the river shore. There are also through tracks, called thoroughfares, for movement in each direction, passing between the east and westbound yards. These provide clear entrance to the various minor yards, repair tracks and transfer sheds, and are the principal avenues for locomotives to and from the engine house.

ENGINE MOVEMENT.

Advantage is taken of the high elevation of the hump between the eastbound yards in providing an archway with double circular tracks passing under the hump, and these, in connection with the thoroughfare tracks, provide the entrance to the engine house and at the same time turn the engines without requiring them to go to the turntable. To illustrate the movement, westbound trains are handled by road engines to the end of the westbound receiving yard. Here the engine is cut off, and it passes around the kite-shaped track or loop to the inspection pits, ash pits and coal wharf. If repairs are needed it enters the engine house; if not, it goes to the storage yard and is headed in proper direction for an eastbound train.

An engine in the eastbound receiving yard having arrived from Renovo or other points west would saw out of the yard at the point "A," marked on the plan just west of the loop, and it would then enter the engine house tracks and after receiving inspection and supplies go to the storage yard, still headed east. This disposes of inbound engines from the east and the west. It is expected that 66 per cent. of the engines will not require turning, and all inbound engines when they are in the storage yard will be headed east. All locomotives at this terminal being pooled, there will be little selection in despatching them, except as to size, and the majority of the engines are of the consolidation type. It will require 15 switching locomotives to operate the yard, and 152 road engines will be tributary to it.

If an engine is required for Sunbury, Wilkesbarre, Lewis-town or Harrisburg, it will move directly from the storage yard head on to the eastbound departure yard and take its train.

An engine wanted for Renovo or other westbound trains would be headed east in the storage yard, but it should, however, be headed west for its train. Such an engine would move out of the storage yard and back around the loop, cross over the inbound track at "B" and having gone around the loop would be headed west. Therefore, all engines in the storage yard are headed east and can be moved directly east, or around the loop west, as may be necessary.

YARD CAPACITY.

The ladders at the yards are on a No. 7 angle, and the frogs are No. 8. The capacity of the yard is based on a length of 40

ft. per car. The westbound receiving yard when entirely laid with rail will have 12 tracks and a capacity of 1,163 cars. The tracks have a capacity of 77 to 110 cars each. Eight of the shorter tracks will be laid at present. The weighing requirements at Northumberland are not such as to warrant the use of scales at the humps, and the 63 ft. scales are on a straight through track. The westbound classification tracks will be entirely completed at present, and there will be 20 tracks with a total capacity of 859 cars.

Between the westbound classification and departure tracks there is a small grid of 8 tracks with a capacity of 8 cars each. This is called the "station order sifter," where the cars for small local freight trains are classified.

The westbound departure yard is planned for 8 tracks, with a capacity of 90 to 100 cars each, and a total capacity of 733 cars. Only one-half of the tracks will be laid at present. At the west end of the yard there is the cabin hump with only two tracks, but ample space is graded for further enlargement, and there is a cabin storage yard, with a capacity for 34 cars.

The eastbound yards are arranged tandem like those above described, but with larger capacity. The receiving yard will have 8 tracks of full train length, and a total capacity of 750 cars. The rails will be laid for 5 tracks at present. The two tracks at the east end of the yard pass over the concrete arch at the hump, and a switch with inclined track permits road and yard engines to descend to the lower level in order to reach the coal wharf and engine house.

The eastbound classification yard has the largest number of tracks, but they are shorter, having a capacity of 28 to 50 cars. The yard is graded for 30 tracks, with a total capacity of 1,170 cars, and rails will be laid on these with the exception of 6 tracks. The east end of this yard has three outlets, one leading directly to the station order sifter. Directly north of the sifter there are two yards for crippled cars, one with a capacity of 158 cars; the other is graded for 5 tracks holding 65 cars. The other two outlets lead directly to the eastbound departure yard, which is graded for 10 tracks to hold full length trains with a capacity of 805 cars. This yard terminates at the east end, with a cabin yard for 72 cars and a cabin hump with three tracks. The usual movement of the engine after leaving the house is to back into the cabin yard, get its cabin car and place it on the adjoining hump. It then pulls the train out of the departure yard with its rear end beyond the cabin hump, when the cabin car descends the grade and attaches itself to the train automatically.

A subsequent article will take up the locomotive terminal buildings and other structures.

FOREIGN RAILWAY NOTES.

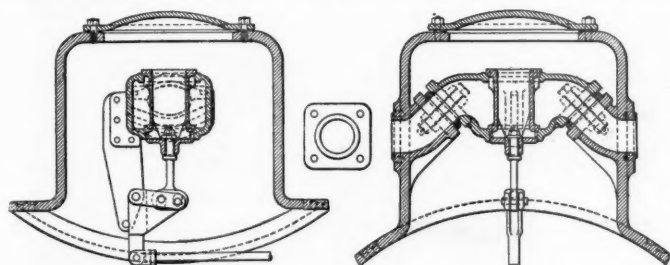
A large increase in the trade, both import and export, of Yunnan, China, is reported to be following the opening of the French railway to Yunnan-fu. Several large foreign houses are stated to have already opened in that city. The Chinese government has sent officials into the province of Yunnan to make investigations and surveys with a view to opening more marts in that province to international trade.

For nearly 10 years the Chinese have been bent on building the Szechuen railway in China themselves. Considerable energy was shown in inducing investors to buy shares, and for years money was collected until a total sum of about \$10,000,000 was realized. The subscribed shares are about 25 per cent. of the whole, the remaining 75 per cent. being derived from various taxes. According to a statement made a few months ago by the president of the railway, the company had then about \$600,000 on hand, and there was an annual income from shares and other sources of over \$1,200,000. The chief engineer and the acting chief engineer were instrumental in building the Peking-Kalgan railway, the successful completion of which shows much ability.

MALLET ARTICULATED LOCOMOTIVE; CHICAGO GREAT WESTERN.

The Chicago Great Western has recently placed in operation between Oelwein, Iowa, and Dubuque ten Mallet locomotives having the 2-6-6-2 wheel arrangement, which were built by the Baldwin Locomotive Works. The engines are intended to operate between Oelwein, Iowa, and Stockton, Ill., where a new terminal is very nearly completed. The high pressure cylinders are 23 in. x 32 in., the low pressure cylinders, 35 in. x 32 in., and the driving wheels 57 in. in diameter. These engines are not fitted with a feed water heater or a superheater, and the boiler is of the ordinary construction. The cast steel dome is shown in detail and it will be seen that it has the openings for the high pressure steam pipes cast integral with flanges for connection by ball joints to the throttle valve, making a simple and direct design. The steam pipe is 5.56 in. inside diameter, the body being wrought iron pipe fitted to cast iron flanges and caulked with a 1/16 in. copper gasket.

The exhaust from the high pressure cylinder is placed on the center line of the boiler with the ball joint at the back end, which coincides with the center of the articulated frame connection. Thus the variation in the length of this receiver pipe is due to temperature changes only, and to compensate for this the slip joint is provided. The high pressure cylinders are bolted to the saddle, while the low pressure cylinders are cast with the saddles which are joined at the center line. The valves are of the plain flat



Steam Dome Showing Throttle Arrangement.

type, but balanced, and are controlled by the Walschaert valve gear. The Ragonnet reverse gear is used in which the cylinder ports are arranged so that the motion of the hand lever is the same as the usual reverse lever; that is, a forward position of the lever controls a forward motion of the engine.

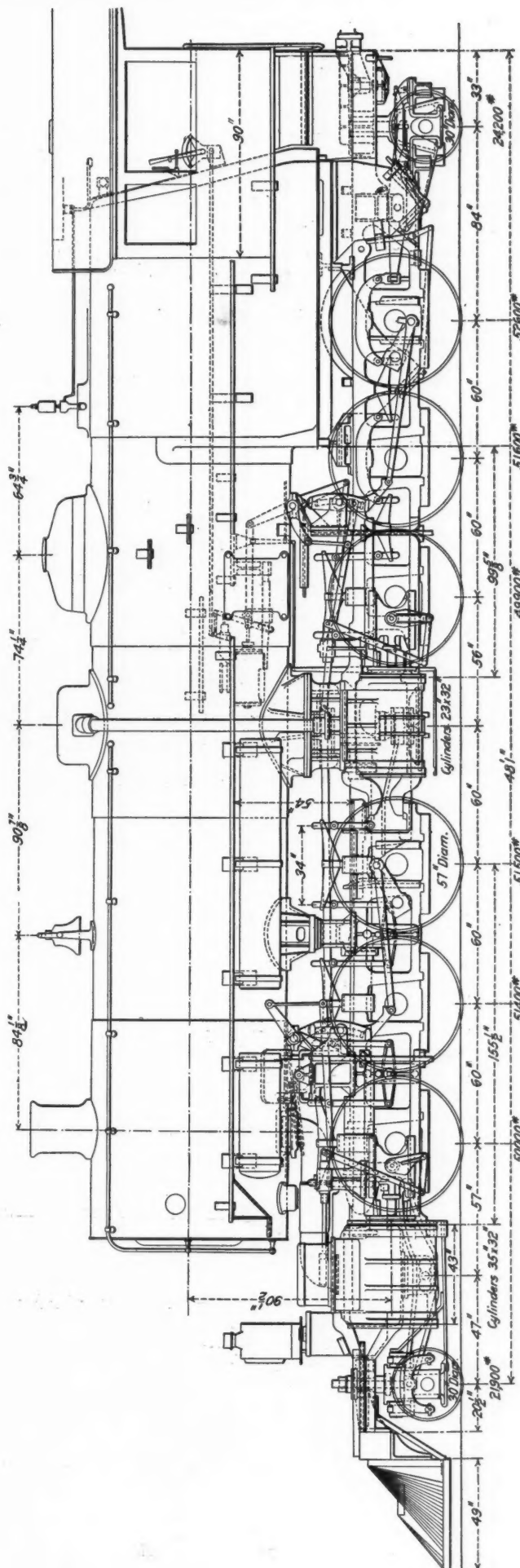
The main frames are cast steel, with the rear ones in one piece and the forward ones having a separate front rail. The main frames are 5 in. wide and the auxiliary front frames 4½ in. wide. The locomotives are equipped with pneumatically operated cylinder cocks for the low pressure cylinders, and there is a force feed oil pump for lubricating them. The high pressure cylinders and the air pumps are oiled from a lubricator placed in the cab, and a separate oiler is provided for the power reverse cylinder. There are two sand boxes for the front group of wheels, which are placed over the front deck plate, and the back group is supplied with sand from a large box placed over the boiler in the usual way. Following are the principal dimensions and ratios:

General Data.

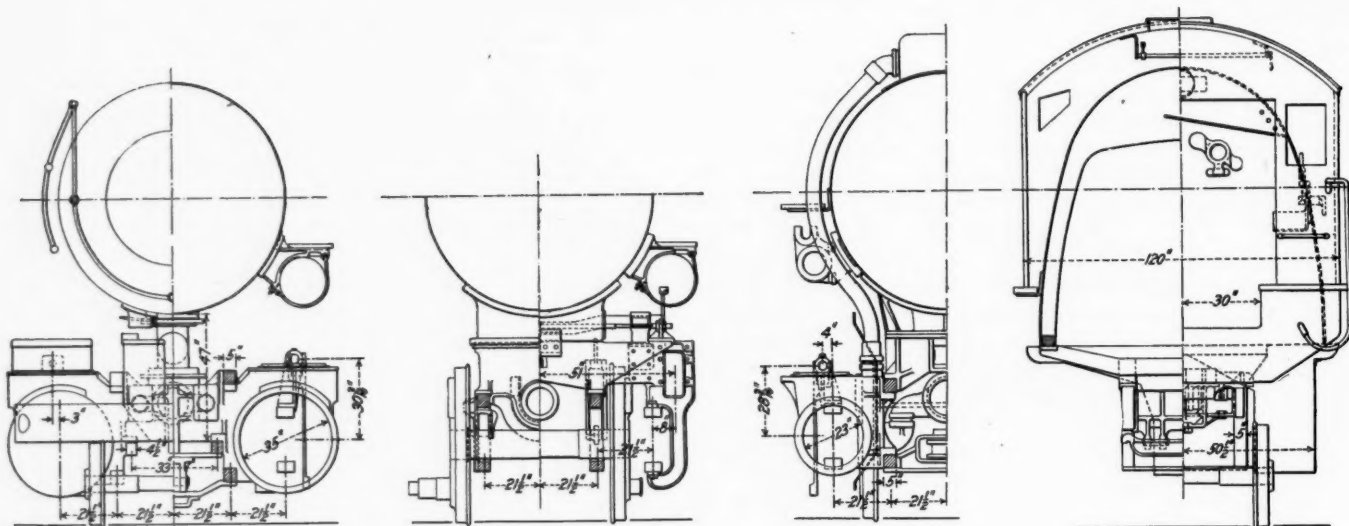
Type	2-6-6-2
Service	Freight.
Fuel	Bit. coal
Tractive effort	81,000 lbs.
Weight in working order	353,100 lbs.
Weight on drivers	307,000 lbs.
Weight of engine and tender in working order	505,000 lbs.
Wheel base, driving	29 ft. 8 in.
Wheel base, total	45 ft. 4 in.
Wheel base, engine and tender	71 ft. 11½ in.

Ratios.

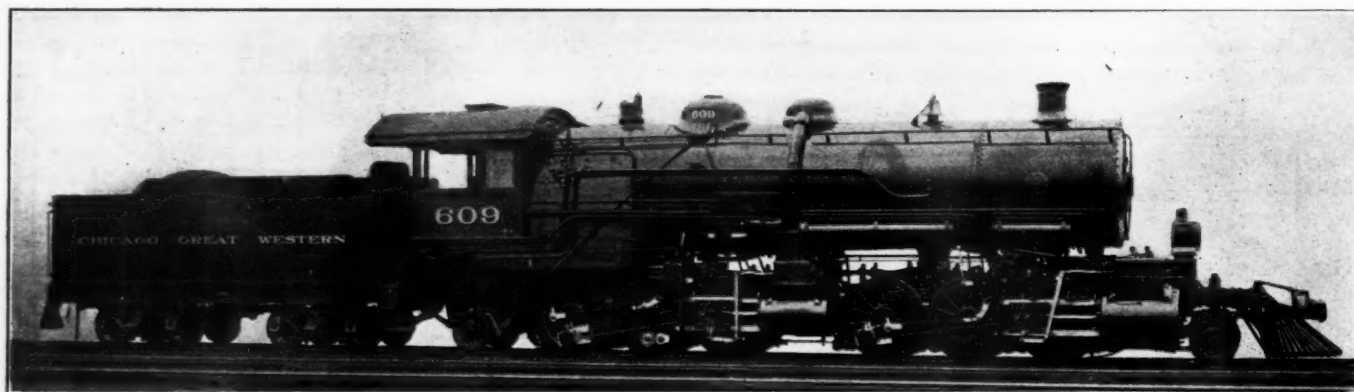
Total weight ÷ tractive effort	4.36
Weight on drivers ÷ tractive effort	3.79
Tractive effort × diam. drivers ÷ heating surface	801.
Total heating surface ÷ grate area	74.
Firebox heating surface ÷ total heating surf., per cent. ..	3.92
Weight on drivers ÷ total heating surface	53.2
Total weight ÷ total heating surface	61.1
Volume equivalent simple cylinders, cu. ft.	24.1
Total heating surface ÷ vol. cylinders	370.
Grate area ÷ vol. cylinders	3.24



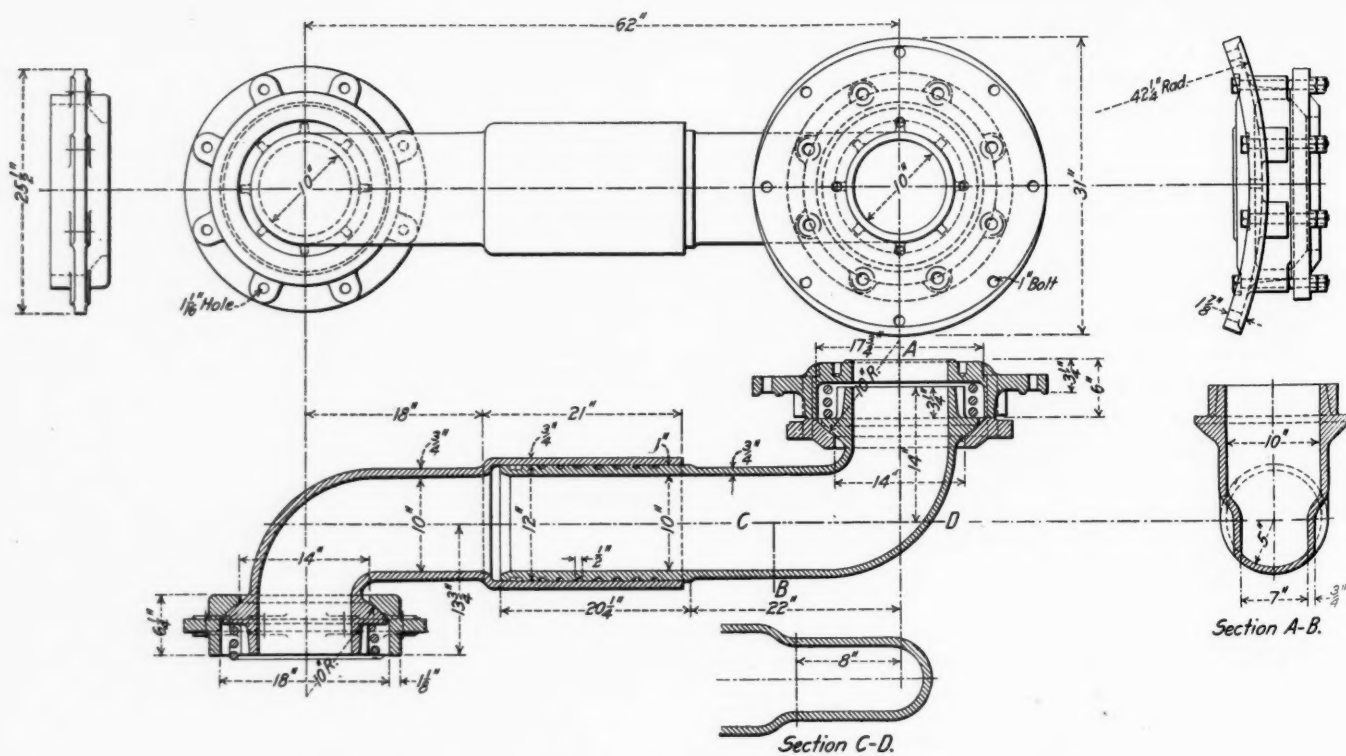
Mallet Locomotive for the Chicago Great Western.



Sections of Mallet Locomotive; Chicago Great Western.



Mallet Locomotive; Chicago Great Western.



Low Pressure Exhaust Pipe for Mallet Locomotive.

Cylinders.	
Kind	Compound
Diameter	23 in. and 35 in.
Stroke	32 in.
Valves.	
Kind	Slide
Wheels.	
Driving, diameter over tire	57 in.
Driving, journals, main, diameter	10½ in. x 12 in.
Engine truck, diameter	30 in.
Engine truck, journals	6 in. x 12 in.
Trailing truck, diameter	30 in.
Trailing truck, journals	6 in. x 12 in.
Boiler.	
Style	Straight top
Working pressure	205 lbs.
Outside diameter of first ring	86 in.
Firebox, width and length	96 in. x 117 in.
Tubes, number and diameter	450—2¼ in.
Tubes, length	21 ft.
Heating surface, tubes	5,540 sq. ft.
Heating surface, firebox	226 sq. ft.
Heating surface, total	5,766 sq. ft.
Grate area	78 sq. ft.
Tender.	
Wheels, diameter	33 in.
Journals	5½ in. x 10 in.
Water capacity	8,000 gals.
Coal capacity	16 tons

NATIONALIZATION OF RAILWAYS.*

BY ERNEST R. DEWSNUP,

Professor of Railway Administration, University of Illinois.

As a matter of practical politics, the problem of the desirable relationship of the state towards the railway has been settled in most countries of the world by the adoption of a policy of nationalization. In but three or four of the more prominent countries does the state take no part in railway management, and, in the case of England, one of the two great strongholds of independent railway enterprise, it is interesting to note, that, in nearly all of her colonies, possessions, and protectorates, the imperial or colonial governments have freely undertaken the responsibility of railway management. The record of the last few years shows very clearly that the tide of railway nationalization is strong and steady. The acquisition, by the state, of the Western Railway of France, of the West of Flanders Railway of Belgium, of the railways of Japan and Switzerland, the extensive purchases of private lines by Austria, and the resumption of state operation by Italy, are examples in very recent years of the vigor and vitality of the movement. The forces underlying this development have been very complex. Political unity, social amelioration, industrial progress, and financial gain have all been influential motives, varying in relative intensity, of course, in different countries. If, however, one examines the history of that period from which the substantial growth of nationalization really dates, namely the third quarter of the nineteenth century, the importance of political motives in promoting this movement is very conspicuous. Thus, in Belgium, as in Switzerland a quarter of a century later, the fear of foreign financial control of the railway system was a powerful factor in inducing the resumption of state activity in the railway industry. In Austria and Italy the relation of the state railway system to political harmony and to military strength was regarded as a very important one. Because of this fact, the rehabilitation of state railway systems inaugurated in the decade 1868 to 1878 must not be viewed as a vindication, justified by the history of the previous generation, of the economic benefits of state as against private management of railways. The record of state railway management up to that time had been a very discouraging one. In Belgium, for instance, for five years after the opening of her first mileage, the state constructed and operated all railways, but the financial results were so unsatisfactory that the extension of the system was entrusted to private enterprise. In Austria and Prussia the inability of the state to secure adequate financial returns from its railways led to the temporary abandon-

ment of the policy of state expansion. Similar experiences, it will be remembered, were the lot of certain states of this Union. There were no facts in 1870 which could be adduced to establish the economic advantage of state railway systems. On the other hand, there were conspicuous examples of the successful working of private roads in America, in England, and even in continental Europe. At the very time when the Prussian Diet expressed itself in favor of continuing further with the project of a national system, private enterprise was clamoring for railway concessions, in spite of all restrictions that the government had imposed upon construction and working. One of the considerations that induced the Belgian government, in 1871, to resume its railway activities was the too successful competition of the private companies with the state lines. Some companies, it is true, had not met with success, but the financial failures of such roads seem to have been mainly due either to the excessive restriction of governments inclined to paternalism or to the fact that they had been located, under the influence of the state, in regions of scanty population and poor economic possibilities.

Apart from ideas of the promotion of political unity or political aggrandizement, some fear was entertained that this new industrial power, promising to become of huge magnitude, might become a political danger, if left in private hands. The unconciliatory and undiplomatic spirit, manifested, at times, by some of the railway managers, served but to foment such a feeling. A more general influence in favor of the movement towards nationalization was the reaction against the *laissez-faire* teachings of the Smith school, which by this time, had gained considerable strength, as is concretely evidenced by the economic congresses of Eisenach and Milan in the early and middle seventies. There was thereby induced a more favorable attitude towards the intervention of the state in the field of economic production than at any previous period of the century. Since that time the affection of the peoples of continental Europe for government paternalism has, if anything, grown greater, and, as a whole, they are inclined to accept, without argument, the theory of the beneficence of state railways. Nor is this feeling limited to these countries. Twenty-five years ago, Professor Hadley, in concluding his book on railway transportation, said, "There is a strong popular feeling, to a large extent unsuspected by those in authority, in favor of government ownership of railways as a system." Undoubtedly, in England and America, there are today, among the working classes particularly, strong leanings in this direction—the doctrinaire product of social idealism but nevertheless to be reckoned with in the near future. A similar, though less extensive, impression has apparently been made on other classes of society. I have sometimes wondered whether the large increase in the number of state employees, which has naturally accompanied the growth of entrepreneurial and regulative functions on the part of the state, has not had an appreciable influence upon public sentiment. The ideas of the majority of such employees as to the functions and capacity of the state are apt to be affected by their very relationship to it, and these would easily be disseminated, by their medium amongst a considerable section of the public. This concept of the general beneficence of state policy has fostered the belief that, under the ultimate influence of state management, the railway system may be so organized as to promote the social amelioration and industrial progress of the community in a manner impossible under conditions of private operation. During the last generation, governments undertaking railway nationalization, and other advocates, have laid increasing emphasis upon this assumption. They have unrolled before their audience, the people, an attractive picture of railway systems without capital charges, levying minimum rates and fares, with innumerable resulting advantages for every one. To what extent this picture has found realization in actual conditions we shall shortly see. But, however, that may be, its influence on the progress of nationalization is unquestionable.

Interwoven with the strands of this medley of politics and

*A paper read before the American Economic Association, December, 1910, at St. Louis, Mo. Reprinted from the Papers and Discussions of the Twenty-third Annual Meeting, March, 1911.

social idealism, here and there appears the motive of artificial stimulation of economic development. The desire of relatively undeveloped communities to hasten the natural growth of their estates is not a surprising one, nor is it strange that they should select the state management of railways as their means to that end. Whether their object is best attained in this way is another matter. The construction of a larger amount of railway mileage may be thus secured, with attaching increments of traffic, but this does not in itself justify the policy. The direct financial losses usually involved, the indirect losses arising from an arbitrary diversion of national resources of labor and capital from other interests, the effect of the distraction of the attention of the government from those very important elements of national welfare which are not economic, the possibility of the stimulation of private enterprise, under judicious supervision and with suitable aid, into the accomplishment of its aims, all need to be taken into full account; but, unfortunately, such communities scarcely ever take the time to cast a trial balance of gains and losses.

Such are some of the leading influences that have led towards nationalization, each one of which would form a most interesting study. Obviously, only the bare outlines of the general movement could be sketched in this paper, sufficiently distinctly to indicate that, from the point of view of permanent public welfare, there is still justification for further discussion of a problem which practical politics has declared settled.

The leading aspects of such a discussion are twofold, (1) the effect of the state upon the railway; (2) the effect of the railway upon the state. Under the former head falls the question of the financial remunerativeness of state railways, an important, though not conclusive, test of efficiency. Varying conditions of construction and operation render the correct application of this test a very difficult one. For instance, to attribute greater efficiency to Australian railways as against British railways, because of a 4 to 4½ per cent. dividend as against a 3½ per cent. would be ridiculous. Owing to the value of land, state regulations, and standards of construction, the capital per mile of railway in Great Britain is five times that of Australian railways, some of the recent extensions of which, by the way, have been made at the low figures of \$5,000 per mile, sufficient to lay down but the flimsiest of tracks with the absolute minimum of facilities. Differences of capitalization and of rate levels may make interest rates incomparable things. A still further difficulty appears in the frequent unreliability of the financial statements of state undertakings of large capital and revenue accounts. The utilization of other state funds for the reduction of railway debt is an attractive financial manipulation which has notably vitiated the significance of quite a few capital accounts. Discussing the industrial domain, with particular reference to factories for the provision of army and navy supplies, Bastable says, "On purely financial grounds, state industries of the kind are open to serious criticism, owing to the very defective system of keeping accounts which is characteristic of such establishments. The amount of invested capital is hardly ever properly estimated; receipts that should go to capital are assigned to revenue, and expenditure that ought to be met from revenue is defrayed from other state funds or by borrowing." And as he reminds us in a footnote, Richard Cobden, in his last speech in the British Parliament, now some forty-six years ago, protested that, "Throughout the inquiries before Parliamentary committees upon our government manufactories, you find yourself in a difficulty directly you try to make the gentlemen at the head of these establishments understand that they must pay interest for capital, rent for land, as well as allow for depreciation of machinery and plant." In his illuminating articles upon the Belgian state railway system, published some four years ago in the *Revue Politique et Parlementaire*, M. Marcel Peschaud charged the state's system of railway accounts with the greatest confusion, credits relating to the railway having been distributed among five different budgets. Among other defects, he noted

the fictitious nature of amortization as represented in the railway accounts, with the result that, "it is not possible," he said, "to fix with accuracy the actual amount of capital expenditure, nor, in consequence, the real charges relating to this capital." This same element of fictitiousness in the amortization accounts appeared, he stated, in the Prussian railway accounts. Elsewhere he remarked, "Nothing is more difficult than to ascertain exactly the financial results of a state enterprise. This is true, no matter what may be the country or the industry concerned. While simplicity and clearness of accounts are the law of private industry, complication, fiction, and obscurity are the rule in state industries." In state railways, therefore, we need apprehend no danger of understatement of capital percentages of surplus earnings, and while such figures, whether correct or incorrect, are not adequate indications of relative efficiency, they may still be used, in a rough sort of way, to throw some light upon the general financial productiveness of state railway systems. Generally speaking, the results have been poor. For instance, in 1907, quite a favorable year for railway traffic, the state systems of Europe, excluding Prussia and Saxony, earned possibly 3 per cent. upon their reputed capitals. Thus France (l'ancien réseau de l'Etat) 1.87, Italy 2.18, Norway 2.64, Sweden 2.75, Denmark 2.92, Württemberg 2.47, Austria 3.01, Belgium 3.29, Bavaria 3.45, Hungary 3.50, Imperial Railways of Alsace-Lorraine 3.58, Switzerland 3.62, Baden 3.90 per cent. In 1908, when the effects of the economic depression which commenced in the United States in the fall of 1907 really began to be felt, the average return fell considerably below 3 per cent. Such results indicate that most of these railways, on a proper representation of capital probably all of them, were actual burdens upon the finances of their respective states, for the latter have usually had to pay from 3½ to 4 per cent., or even more, for the necessary capital. It has been urged that most of the state railway systems of Europe show little or no financial success because the governments have used their railways, not for purposes of gain, but for the promotion of trade and industry by low transportation charges. The argument is a very sophistical one. If this were a characteristic of state management, then the most important state railway administration, that of Prussia, would not have been paying dividends of 5, 6 and 7 per cent. for the last thirty years. Bismarck, it is true, promised the Prussian diet that, if the purchase of the private railways were authorized, railway surpluses should be used for improvement of the system, not for the financial benefit of the treasury. But fat railway surpluses have proved too much even for Prussian self-restraint, and the state has hugely enjoyed them. There is not a railway-owning government of Europe but would be glad to secure help to its national finances from the profits of railway working. The low railway charges of such countries, in so far as they are low, are to be largely credited to the irresistible pressure of very limited individual purchasing power. But while passenger rates are low, there is reason to doubt whether this can be said of freight rates, an adjustment which savors more of political expediency than of economic advantage. Attempts to make state railways more profitable have not been unknown. But recently, Austria and Hungary have appreciably raised their charges. Russia, Denmark, and other states, at different times, have made general increases, in some instances realizing to their discomfiture that such increases may destroy sufficient traffic to leave unaltered, or even to reduce, gross revenue. In countries where the average income of the great mass of the population is low, charges that appear low from the standpoint of, say, an American, may actually be as high as the traffic can be made to bear. It is not denied that, in a number of instances, the taking over of private lines has been signalized by some reduction of rates and fares, a preliminary taste as it were of the future good things that the government had in reserve, but the process has hardly been a continuing one. Take, for instance, the state railway system of France as against the private companies, and one finds that, whereas, from 1888 to

1908, the state receipts per tonne-kilomètre increased from 5.15 to 5.23 centimes, those of the private companies fell from 5.66 to 4.20 centimes. Even in passenger kilomètre receipts, the favorite altar for the propitiatory sacrifices of government, the decrease in the state system was but $9\frac{3}{4}$ per cent. as against 28 per cent. in the case of the private companies. The passenger receipts of the state are still slightly the lower, though part of the difference can be put down to its appreciably higher proportion of third class traffic.

Saxony has had somewhat better fortune than the states just dealt with, for though the percentage earned on reputed capital was but 3.78 in 1908, for some years preceding 4 and 5 per cent. surpluses were the rule. Prussia, however, is the one example of marked financial success over a period of considerable length. This unusual achievement was favored by the fact that active state control was undertaken just about the time when the great economic advance of Germany was commencing. Financial prosperity was assured in advance. It is fair to inquire whether under such conditions, the Prussian state railways have accomplished for the economic development of their country all that might reasonably have been expected from them.

Despite statistics showing the growth of the commerce and industry of Prussia, which prove nothing, as no one can tell what would have been the results with a different system of management, I am inclined to think that they have not done so. So far as my reasons for this opinion can be expressed in brief they are as follows: Prussia is operating her railway system under peculiarly advantageous conditions, namely, compact territory, dense population, favorable physiographic conditions, unity of railway management arising from the fact of state operation, low labor cost, low taxation, a people temperamentally and by military training inclined to take severe restrictive control as a matter of course. For instance, Prussia has five times as many people per mile of line and twice as many miles of line per unit of area as the United States. The enormous physical obstacles to economical operation offered by the Rocky Mountains are absent. The practical monopoly enjoyed obviates many expenses of organization and of competition for traffic. Taxes per mile of line are little more than half those of the United States. Railway labor cost per individual averages about half that of this country. Add to these the high average intelligence of its people and the rapidity of economic progress, and all the elements of efficient and economical operation, making easy the combination of very low charges with high rates of profits, are present. Yet what has been accomplished? For one thing comes the reply, extraordinarily low passenger rates, rather less than one cent per passenger mile, in 1908, as against 1 $\frac{9}{10}$ cents in the United States. But there are several points to be noted in connection with this. In the first place, Prussia, with its denser population, affords to the railways a passenger density of four and a half times that of the United States, and such enormously greater density, in the case of traffic that handles itself, lowers the cost per mile very considerably. In the second place, the third, and especially the fourth class in Prussia represent facilities which the average American traveler would not put up with for the small annual amount he would thereby save. In the third place, the cheapest accommodation that can be properly compared with that of American passenger trains, the second class, averages 1 $\frac{6}{10}$ cents per passenger mile, a charge which represents quite as much to the average German as 1 $\frac{9}{10}$ cents does to the average American. In the fourth place, though operating costs are low, there is ground for suspicion that Prussian fourth class rates are more helpful politically to the government than profitable to the railway. Passengers, however, bring in but 28 per cent. or so of total operating income, while freight traffic produces about 65 per cent., a similar ratio to that of the United States. Moreover, of the two branches of the service, freight traffic is the one which calls for the exercise of most skill; it is also readily susceptible to reductions of cost. The Prussian Railway Department seems

to have failed to realize its opportunities. From 1880-1908 freight transportation charges in Prussia decreased about 15 per cent.; in the United States, during the same period, they decreased nearly 40 per cent. The average ton-mile receipt of Prussian railways, in 1908, was 1.24 cents; in the United States .754 cents, nearly 40 per cent. less, really about 60 to 65 per cent. less if equivalent purchasing power be taken into account. The Aushahme tariffs, covering wagon loads of 22,000 lbs. and over, and accounting for 21,144 million tonne-kilomètres out of a total of 32,810 million, very largely coal, ores, lumber, stone, earth, raw materials and grain, worked out at an average receipt per ton mile of 90 cents, in spite of the depressing influence of political export rates, a figure very appreciably higher than the average for all classes of goods here. The normal tariffs for wagon loads, accounting for 9,600 million tonne-kilomètres, gave an average receipt of 1.5 cents per ton mile. These figures are only averages and easily liable to misinterpretation, but the differences indicated are so great as hardly to leave room for any doubt as to the superior economy of American freight transportation to its users. There is a much closer similarity in the general make-up of the tonnage than some writers have supposed. Nor can the difference in average haul have any greatly disturbing effect on the comparison, for the great bulk of the tonnage in both countries is low class carload traffic, loaded and unloaded by shippers and consignees. Terminal charges for handling this class of traffic are comparatively light, and therefore cannot be responsible for the difference of costs, such as occurs in short and long distance hauls of freight that has to be loaded and unloaded by the railway. Then it has to be borne in mind, in connection with this carload freight, that increase in length of haul means increase in the number of division yards that have to be passed through, involving rehandling in the case of most trains; also that wages of enginemen and trainmen, cost of fuel and supplies, and cost of maintenance of rolling stock tend to keep pace, more or less exactly, with increase of haul. The density of freight traffic, it should be observed, is nearly the same in both countries.

Further, throughout the whole comparison, the different wage costs need to be borne in mind. In the United States, 60 per cent. of total operating expenses is consumed by wages and salaries, and the average rate of pay of the American railway employee runs at least 100 per cent. greater than that of Prussian employees, including all allowances and so forth. This means that, if American employees were paid on the same basis as Prussian, freight rates could be reduced to just half Prussian rates and passenger rates to the same level, while net income would actually be greater than it is now.

The contrast between the freight and passenger rates of Prussia is such as inevitably to create the impression that the former constitute more or less of a tax upon facilities, and this feeling is emphasized when one bears in mind the severe restrictions, such as those of the demurrage and loading regulations, to which the freight traffic is subjected. It may be good political policy to maintain passenger fares at a low level, but, if this means that profits have to be bolstered up at the expense of freight charges, it is unfortunate. Since an infinitely smaller proportion of the income of the average individual is spent on railway passenger traffic than on freight transportation, low passenger fares are, in general, of much less economic importance to the community than low freight charges.

Like state managements in general, that of the Prussian railways seems to be inelastic. Some half dozen years ago, the Prussian operating ratio was about 62 per cent.: it was 62.67 in 1905. In the three following years, it rose 12 points, reaching the unprecedented figure of 74.62. In France the increase was from 52 to 58; in England from 62 to 64; in the United States from 66.78 to 70. In all these countries the same economic influences were at work during the period, a general upward movement in the cost of railway labor and supplies, and, during the last year, the pressure of the financial panic was commenced

abruptly in the United States towards the close of 1907. A similar relationship is revealed when the ratio of the state railways of France are compared with those of the five great private lines (the Western being excluded because of the embarrassment of its working by anticipations of purchase). The former increased its ratio from 72.2 in 1905 to 80.69 in 1908, while that of the latter lines increased from 50.2 to 54.8. I do not wish to make the mistake of laying undue emphasis upon figures which represent the results of the action of complex and varying combinations of forces, but such dissimilarities as do exist seem hardly capable of explaining away the criticism of state management involved in the comparison. One of the most eminent students of international railway policy, M. Colson, said but recently, "Les administrations d'Etat, generalement (sont) moins habiles que les compagnies a serrer les prix de revient, a decouvrir et a realiser toutes les economies possibles."

Yet, in some ways, the railway administration of Prussia has been inclined to push economy to the extreme. In 1906 an expenditure of \$50,000,000 on equipment was authorized, and much has been made of this action as an illustration of the advanced policy of enlightened state management. But, as a matter of fact, the conditions of car service had become absolutely lamentable, and the government did not undertake this expenditure until it was actually unavoidable. The 1907 report of the Chamber of Commerce of Essen says: "... the increase of our roadway accommodations, and the provision of rolling stock, etc., has not taken place in a manner corresponding to the development and the necessities of traffic, and, further, ... no progress of general importance has been made in the matter of our good traffic." Charges of this kind are common in the history of the Prussian state railways. Ten years ago, Professor Dr. Arthur Böhltingk, in his pamphlet "Unsere Deutschen Eisenbahnen", wrote: "Although his Excellency Von Thielen has not once been able to provide sufficiently for the demands for rail transport, and although he has repeatedly declared that the railways had reached the limits of their capacity, he seems to have thought less than ever of making them equal to such demands by means of additions and improvements."

Short of an exhaustive analysis impracticable within the limits of this paper, sufficient evidence has been brought forward, perhaps, to indicate how little reliance can be placed upon the argument for nationalization which is based on the results of Prussian railway management. In spite of all its apparent success, I am convinced that the state government has failed to live up to its opportunities. With all the disadvantages and defects of the privately managed American railway system, and notwithstanding the restrictions placed upon its working by federal and state governments, it has contributed far more to national economic development than has the state system of railways in Prussia.

There are certain other features of state railway management, a brief statement of which must suffice, though their importance is considerable. There can be no question but that, where economic conditions render it at all practicable, state railways will endeavor to make profits. The history of Prussia indicates very clearly that, under such circumstances, there is a great probability of too intimate a relationship being established between the financial and railway departments of the state. This is likely to lead, as it has led in Prussia, to a subordination of the economic interests of the industry to the fiscal necessities of the treasury. Again, with the nationalization of the railway system, the experts of that branch of industry become government servants, and as such liable to less searching criticism than when, as the representatives of private enterprise, the sword of government investigation and regulation was constantly suspended above their heads. Like individuals, government is not apt to criticize itself. The depressing effect of government management upon the initiative and self reliance of employees is an old charge, and I will do no more than quote from the report of the recent Board of Trade investigation of Italian railways:

"There is one element in connection with the transfer from private working, and that is the change which has taken place in the management of the personnel. Numerous removals have been effected consequent on promotions being made in order of seniority, which is not in all cases compatible with merit. One hears traders who have had close associations with the officials, in the days of private ownership, deploring the disadvantages caused by the removal of local officials possessing intimate knowledge of the working, and their replacement by officials from probably quite a different part of the country, owing to some claim of seniority. Again, in the staff themselves there has been noticed, it is said, a change occasioned by the transfer from private to state ownership. As state officials, there does not seem to be quite the same amount of willingness to take responsibility; the strict letter of the rules and regulations is the boundary line over which there is no disposition to step."

So much for the influence of state management upon the railway. We may now ask what is the effect of the state railway upon general state administration. This question is worthy of a much more elaborate answer than I can possibly give at the present time, and I shall not attempt to do more than outline some of the leading considerations. First, then, the entry of the state into general or specific industrial competition with its own citizens is neither wise nor proper. Its natural position as the disinterested and unbiased dispenser of justice, revealer of frauds, and adjuster of inequities is prejudiced thereby. Confidence in its impartiality becomes weakened, capital hesitant, private initiative less keen, with corresponding retardation of the material growth of the community. Secondly, the duties necessarily imposed upon the executive of the modern state in connection with the fundamental functions of administration of justice, protection of the community from physical and moral violence, whether in social or strictly economic relations, and guardianship of its physical and mental health, constitute a heavy burden in themselves; and an efficient discharge thereof is far from being attained in the most advanced countries. To superimpose upon these duties the responsibilities of the industrial entrepreneur is to diffuse the energies of the state through a still wider field, over which it is likely to exercise a still less satisfactory control. The capacity of government is not unlimited. Thirdly, in so far as the railways are productive of surpluses, to that extent the executive of the state is relieved from drawing upon the pockets of the taxpayers. It is admittedly difficult even in the most democratic states to keep the executive in responsive relationship to the legislature and to the public. The more dependent the executive is upon funds raised by taxation, particularly direct taxation, the less arbitrary can it become. The ultimate political well-being of the democracy rests upon the practical recognition of this canon of government. Fourthly, fiscal reliance upon railway earnings is apt to prove embarrassing to state finances, at recurring periods, from shrinkage of receipts—a difficulty that is accentuated by the apparent inability of government railways to adjust themselves readily to economic vicissitudes.

From the point of view either of the influence of the state upon the efficient management of the railway system, or of the influence of the responsibility of railway management upon the efficiency of state administration, there is reason to dispute the advantage so loudly claimed for nationalization. The real meaning of railway nationalization is the substitution of uncontrolled state management for controlled private management, and the change is unfavorable to economic progress and efficient government.

The Mogyana Railway and Navigation Company has been authorized to build and operate a railway extending from Igara-pava, in the state of Sao Paulo, Brazil, to Uberaba, state of Minas Geraes, to be incorporated with the Jaguarara-Araguary Railway. By the terms of the contract, the line must be concluded and opened to traffic by September 30, 1912.

REINFORCED CONCRETE BUSH TRAIN SHED.

In the Bush train sheds heretofore designed, concrete has been used only for certain details. In the belief that it might be advantageously used to a much greater extent in some localities, Lincoln Bush has made some determinations in reinforced concrete for train shed construction, and found that the structure could be satisfactorily built entirely of this material. The accompanying drawing shows the design he has worked out.

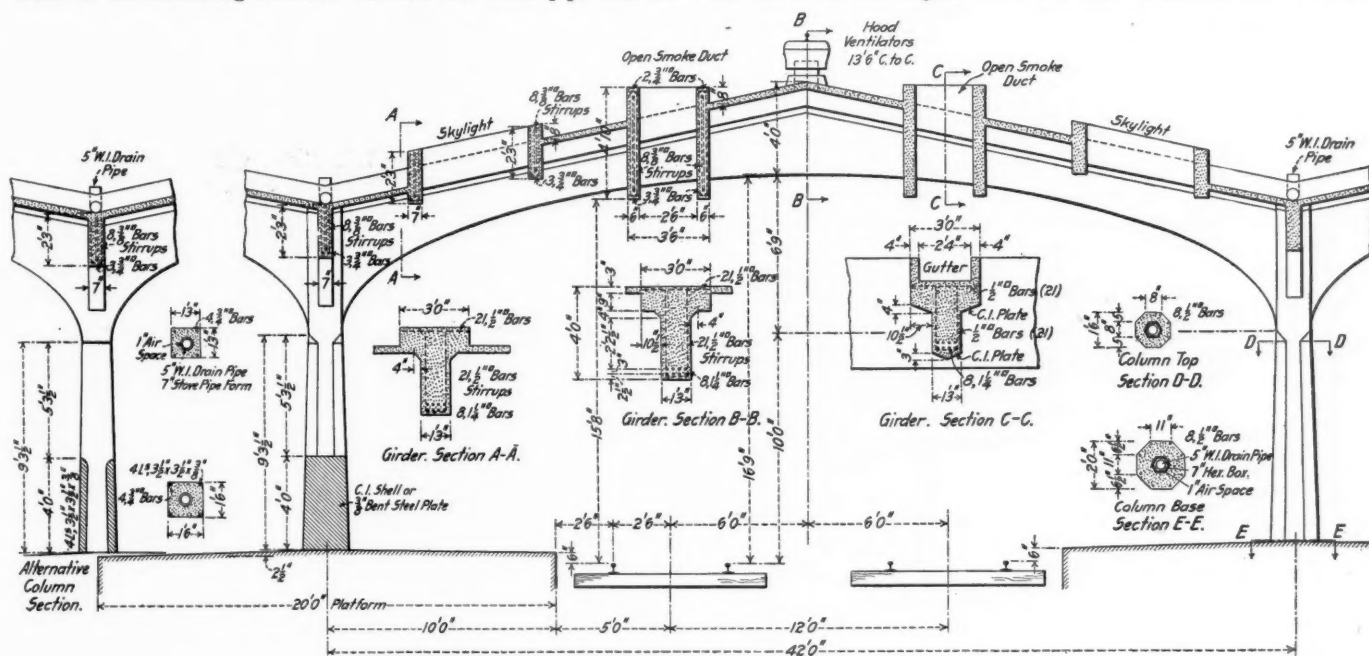
The top cord of the main rafter would be a T-shaped section, and the smoke duct purlins and curbs supporting the skylights, with one longitudinal strut on the center line between columns, would form the longitudinals without any intermediate rafters, the roof slab being built directly into the purlins referred to. The drawing shows the top of the T-section of the main rib rafter flush with the top of the concrete roof. The drainage would be satisfactorily taken care of by carrying the wrought iron drain pipe down inside the center of the concrete column, surrounding this drain pipe with a cast iron hollow pipe which would have about 2 in. larger internal diameter than the outside diameter of the drain pipe. The cast iron shell referred to would form an air insulating chamber between the drain pipe and the

The live load of 20 lbs. per sq. ft. is somewhat under a good many specifications for snow roof load; but, in the opinion of the designer, the roof is seldom loaded with a greater weight of snow than 20 lbs. An increase, however, of 10 lbs. per sq. ft. live load would not very materially increase the sections, as the dead load in this structure is relatively heavy in comparison to the live load.

The drawing shows an alternative square column design. It occupies less area by 6 in. on the platforms than the octagonal column does, but its appearance would not harmonize so well with the rest of the structure. The lower part of the square column would have its corners protected by metal angles, while the lower part of the octagonal one would be entirely incased.

TRACK SCALE WITH MECHANICAL HUMP; PENNSYLVANIA RAILROAD.

The increase in the weight of rolling stock during the last few years has rendered many track scales incapable of sustaining the heavier loads without serious deflection of the members. Of course, scales are not expected to weigh locomotives daily, but travel of the engines over the scale must be safe. Failure



Design for Bush Train Shed in Reinforced Concrete.

cast iron shell; and the cast iron shell would also take the place of reinforcement in the concrete column and would not rust. It is not thought safe to take chances in freezing climates by running the concrete around the wrought iron drain pipe.

A careful estimate of the cost of one full bay 27 ft. long and 42 ft. wide center to center of columns, with liberal unit prices, indicates that the cost, with a good fair margin of profit for the contractor, would be, complete, \$1.47 per sq. ft. This is substantially the same cost as that of the Hoboken shed of the Delaware, Lackawanna & Western (the first Bush train shed erected) which was \$1.50 per sq. ft.; but the Hoboken shed had very much larger areas of skylights in proportion, which increased the cost materially per sq. ft. over this design in which the skylight areas are considerably reduced, but are of ample areas to give an abundance of light.

The loads and stresses are as follows: Live load assumed to be 20 lbs. per sq. ft.; dead load estimated to be 38 lbs. per sq. ft. for 3 in. concrete slab, and for slag roofing 5 lbs. per sq. ft.; column load = 56 tons, approximately; maximum stress in concrete = 650 lbs. per sq. in.; maximum stress in steel = 16,000 lbs. per sq. in.; columns are spaced 27 ft. center to center. longitudinally.

of the foundation or supporting substructure, which in all cases bears a fixed relation to the support of the dead-rail, would be serious. During the travel of a loaded steel car over the scale it imposes a high stress successively on all the scale members. It is by free and unimpaird motion that a lever or any series of levers can fulfill their given functions. The magnitude of frictional effort increases in motion, and where the greatest arc of motion is performed the greatest care must be exercised to obtain the least friction. But, at the same time, friction increases with pressure, manifesting itself when the scale is loaded to its capacity by the prevailing sensitiveness. Where serious deflection occurs, as in weak scales, it increases the errors irregularly with the velocity at which any load may be applied to the scale platform.

To overcome these defects the Pennsylvania Railroad undertook the design of a new standard 52 ft. scale. The first one of these to be installed was at West Brownsville Junction on the Monongahela division. It has several original and unique features, including the suspension bearings supporting the platform, the mechanical relieving gear which eliminates the dead-rail, and the mechanical hump which provides the proper control of the movement of cars over the scale. It will be seen from

Fig. 2, which shows a longitudinal section through the scale and the mechanical hump that all wooden substructure has been eliminated and that the main bearings are of the suspension type, providing greater freedom of action of the platform, in that they get rid of the gyration of the knife-edges across the face of the hardened steels. They also provide greater freedom of action of the platform, due to the greater arcs of motion from the point of platform suspension to the base of the scale rail. In analyzing this bearing, which is shown in detail in Fig. 4, it must be understood that the main lever is rigidly supported from the bed-plate castings and that a saddle block, with compensating steel inserted, engages the knife-edge. From this, in turn, two links are suspended, supporting the yoke casting at eight different points, it being a four-section scale. These yoke castings are bolted to Bethlehem section I-beams, forming a metal bridge from which the scale rails receive their direct support.

With this form of construction it is possible to secure for the platform in a longitudinal direction an oscillating motion ("cradle principle") with sliding friction at the supporting ends of the links. Transversely, however, an undisturbed pendulous motion is secured, while uniform stresses are obtained at all times for the links by the compensating steels in the saddle blocks. All of the main lever stands and the extension lever stands supported from the four main bed-plates are provided with self-compensating steels wherever a pivot contact is made. Means have also been provided to maintain the independent alinement of each individual lever by suitable adjustments at their connections, and leveling pads are provided on all levers, with the faces machined in the same plane with the neutral axis line through the levers.

The scale is provided with a beam reading to 300,000 lbs., and is equipped with a poise operated on specially designed ball bearings, which reduces the resistance of the poise from about four pounds to three or four ounces. A mechanical adjustable spring has also been provided to operate the latch in order to insure its perfect seating in the teeth of the beam at all times. In this type of scale wind pressure or snow and ice on the platform will not affect the empty balance, as the surface platform is supported entirely independent of the scale mechanism. The tipping of the platform and the overhang at the ends of the scale have been eliminated, and all the vital parts of the scale are accessible. The lever system has been scientifically worked out, and 100 per cent. has been allowed for impact, so that the stresses are entirely within the field of experience. This is a point that has been given practically no consideration in the past.

Considering the design of the scale with special reference to the length of the knife-edge and pivot contact, a maximum load of about 4,000 lbs. was provided for each lineal inch of knife-edge, whereas in some of the older types of track scales each inch of knife-edge under a maximum static load had to support as much as 10,000 lbs. or more. Notwithstanding the fact that the length of the knife-edge and pivot contact has been

greatly increased, and in some cases the weight of the levers has been increased three or four times, the sensibility of the scale has not been materially affected. This is due, in a measure, to more machine work that has been done on the scale throughout, causing all parts to be suspended in more perfect repose; and by this same means the neutral axes of the various levers are more nearly preserved. It is also partly due to the fact that more uniform distribution of the load on the lever system can be maintained, owing to the permanent means provided in the main supporting bearings for overcoming inequalities due to wear. All of the friction steels and contact points are made of special vanadium steel. They are said to be less susceptible to corrosion and to give longer life and more enduring accuracy.

Four-section type scales are superior in most respects to those with any greater number of sections, for the reason that all parts in suspension (except the fifth lever) are supported directly from the foundation. When more than four sections are used in a track scale connecting levers must be introduced,



Fig. 1. Standard Scale Office; Pennsylvania Railroad.

which have no multiplying function but simply transmit the motion, and by their use additional fulcrum points are introduced, which are not necessary.

Probably the most radical departure from the old form of construction is the introduction of the relieving gear, taking the place of the rigid dead-rail system with its cumbersome supporting columns that practically fill the vault, preventing proper inspection and maintenance of the bearings and other vital parts of the scale. It also eliminates the second track over the scale, as well as the approaches and switches at either end, leading to and from the scale. The primary construction of the relieving gear consists of a series of eight toggle lever jacks, supported in pairs by the universal bed-plates as shown in Fig. 5. These jacks are operated by the torsion shaft with suitable link connections at each of the four sections. This shaft is, in turn, operated by a double-ended cylinder (Fig. 6) controlled by the weighmaster in the scale-office. The controlling power used is either air or water, air pressure being prefer-

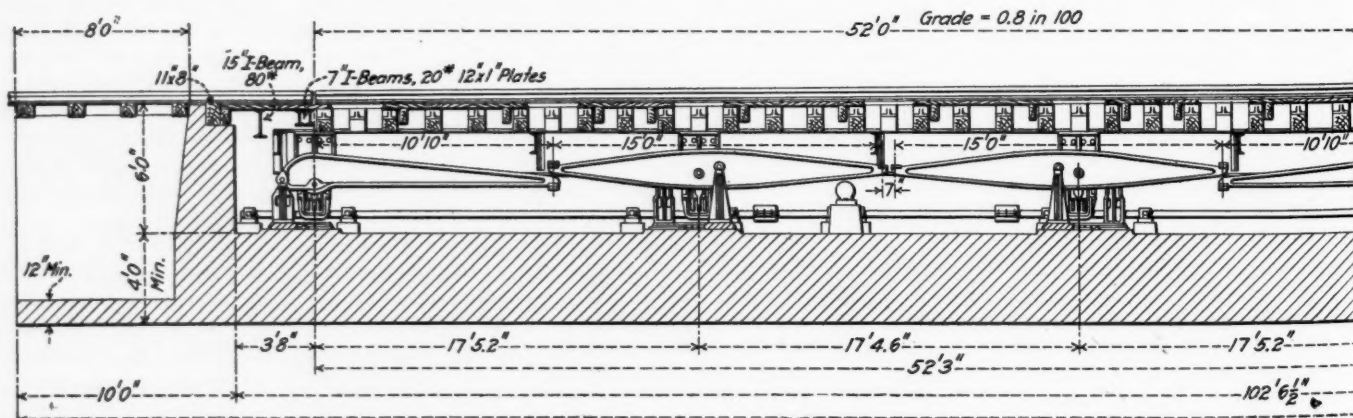


Fig. 2. Longitudinal Section Through the Scale and the Mechanical Hump.

able. In case the power gives out, however, the apparatus is provided with a hand-operating mechanism that can be quickly connected.

When it is desired to make a dead track of the scale track, the weighmaster simply operates a four-way control valve, which causes the four pairs of toggle jacks to move so that the vertical pistons or plungers travel upward against the I-beam supporting the metal bridge. This action raises the platform from a position of repose on the suspension links by taking all weight off the knife-edges without causing their contact on the bearing steels to be disturbed. It will, therefore, be seen that the throwing in and releasing of the relieving gear is accomplished without changing the original alinement of any part of the scale system, and, as the knife-edges do not leave their seats on the steels when the platform is raised, the balance of the scale is practically maintained when the bridge is again lowered on the knife-edges, and the perfect repose of all parts in suspension is practically maintained. When the jacks are operated for the purpose of making the scale track a dead track, the semaphore arms at either end of the scale (which are indirectly connected

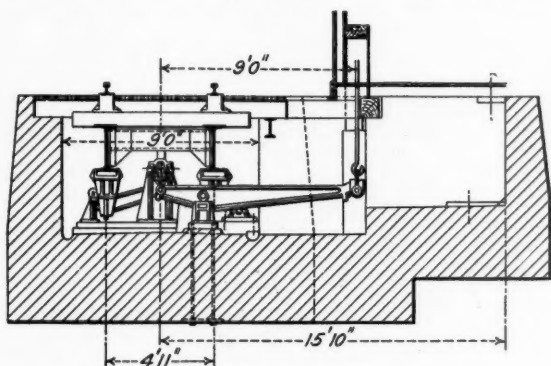


Fig. 3. Cross Section Through Scale.

to the torsion shaft) are simultaneously operated, the position of the arms always indicating when the scale can be used for weighing or when the dead-rail has been set for the use of locomotives, etc.

The total weight of the platform is about 38,000 lbs.; with about 80 lbs. pressure per square inch in the cylinder the bridge can be raised so that a loaded class "H-6" engine and part of the tender (about 267,000 lbs.) will not show any weight on the beam when going over the scale. It will, of course, be impossible to work the operating gear under a superimposed load, but this is not necessary, since the average interval between the cuts of cars is only about 18.6 seconds, and the relieving gear can be operated in one second.

MECHANICAL HUMPS.

The object of the mechanical hump is to provide simple and effective means whereby, with the minimum of attendance, cars

may be passed rapidly and without stoppage over the platform of the scale with the proper velocity to permit each car to be weighed regardless of variations (within the usual limits) in the lengths of successive cars. To accomplish this, the track over which the cars pass to the scale platform is provided with a hump having a fixed apex at a short distance from the adjacent edge of the scale platform so that when the cars are pushed at a uniform rate up the side of the hump remote from the scale, and are uncoupled from each other, before or while being pushed up the hump, each car will run down the hump and on the scale platform with the proper velocity to permit it to be accurately weighed.

Cars passing over a railway scale located at the head of a classification yard are not of one type, and the distances between the front and rear wheels varies on different cars. With the advent of the mechanical hump, however, this variation in wheel-base length is, in a measure, automatically compensated for. When the side of the hump adjacent to the scale platform is short, as it should be, the increase in velocity acquired by the cars running down that side of the hump varies inversely with the length of the wheel-base of the car, other things being equal. This is as it should be, for the interval in which a moving car may be weighed is that between the time when the rear wheels pass on the scale platform and the time when the front wheels pass off, and, in order to keep this interval down to the desired minimum, cars having a long wheel-base should move more slowly across the scale platform than cars having a shorter wheel-base. For rapid and accurate weighing, it is desirable to have the scale platform and the side of the hump nearest the scale as short as possible, and in practice it has been found advisable to make the side of the hump adjacent to the scale platform about equal to the distance between the centers of the truck wheel bases of the cars having the shortest wheel-base.

The hump has been so constructed that the elevation of its apex above the scale platform can be adjusted in order to get the desired relations insuring proper rates of speed of the cars. For instance, the elevation of the hump required in a given installation depends on and changes with the season. In winter, when everything is taut from contraction, the apex of the hump should be somewhat higher than in the summer, when the cars form less rigid structures. The lubricant also becomes stiff, which affects the free running of the cars. With reference specially to yards at which nothing but loaded cars are classified and weighed, or at points where necessity demands that loaded cars should be weighed and empty cars classified over the same hump, a compromise may be effected by changing the elevation of the apex.

It has been common practice to provide artificial humps in classification yards using track scales to facilitate the distribution of cars, etc., but the mechanical hump provides a track running to the scale platform, having its apex at a fixed and determined distance from the scale platform. It also provides

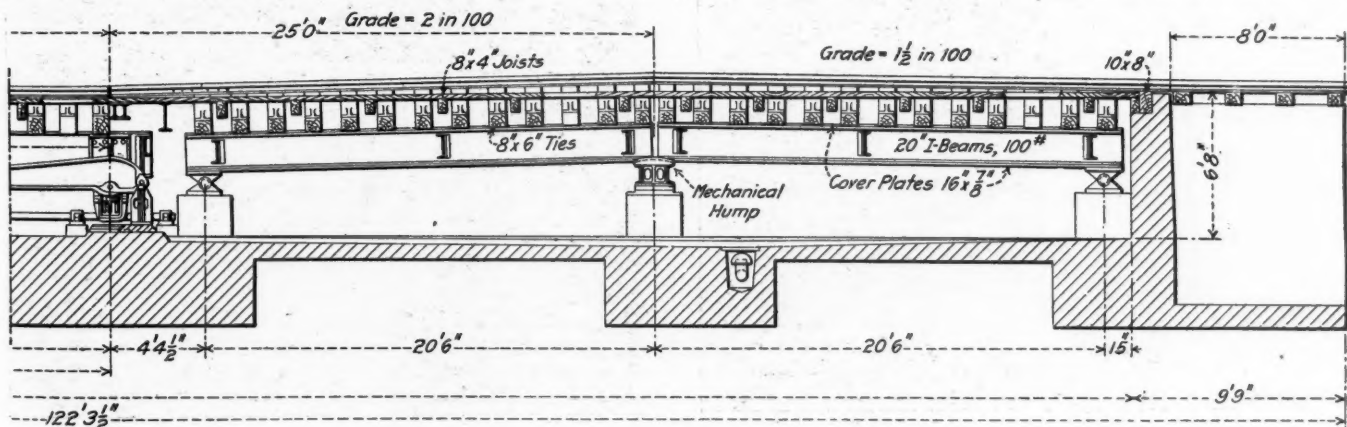


Fig. 2. Longitudinal Section Through the Scale and the Mechanical Hump.

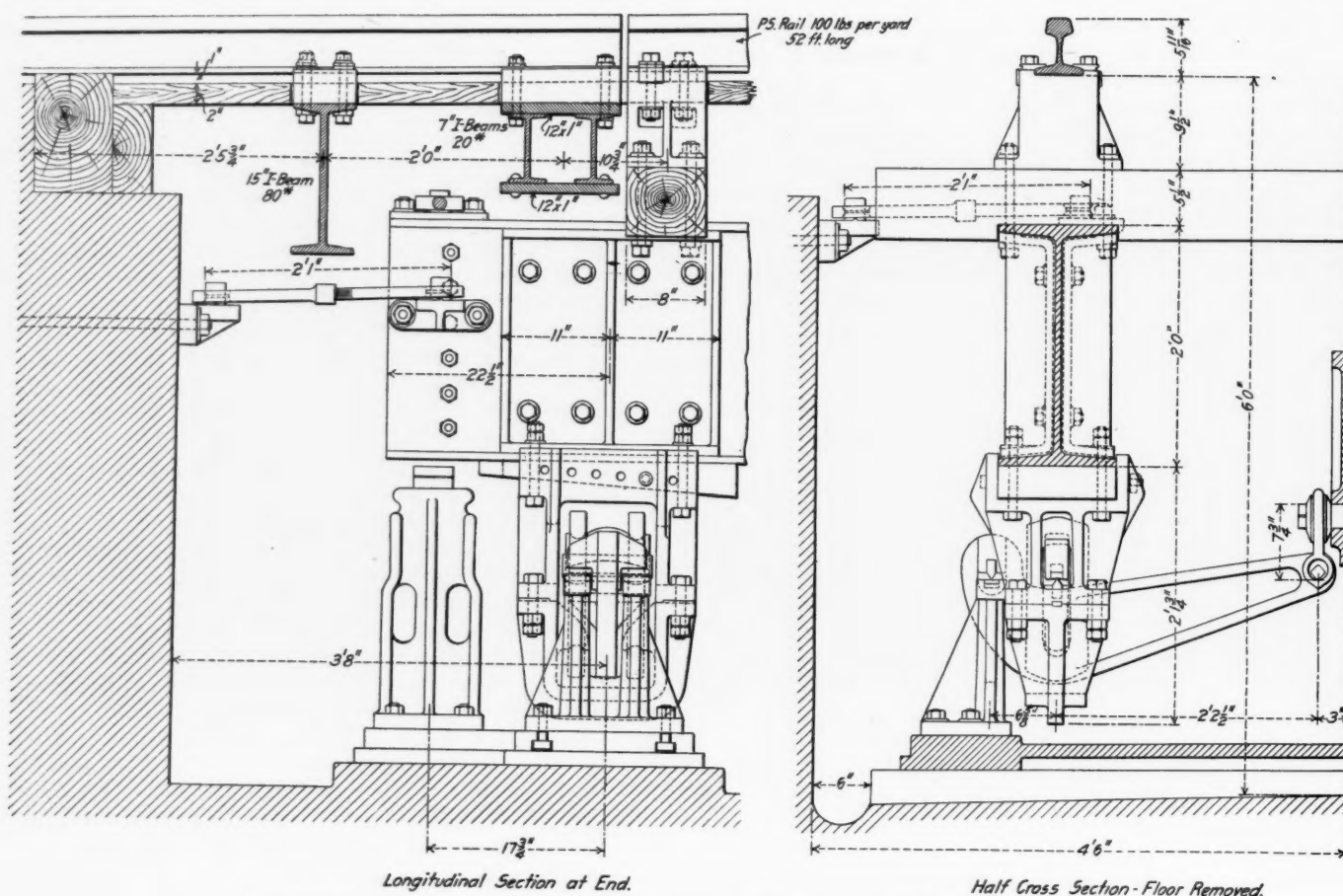


Fig. 4—Important Details of Scale Construction; Pennsylvania Railroad.

a structure of such character that the slope of the hump and the location of its apex will not be changed in time, either by the cars which pass over the hump forcing the cross-ties down in the ballast, or in the repairing of the roadbed by the trackmen. So far as we know, the mechanical hump installed at

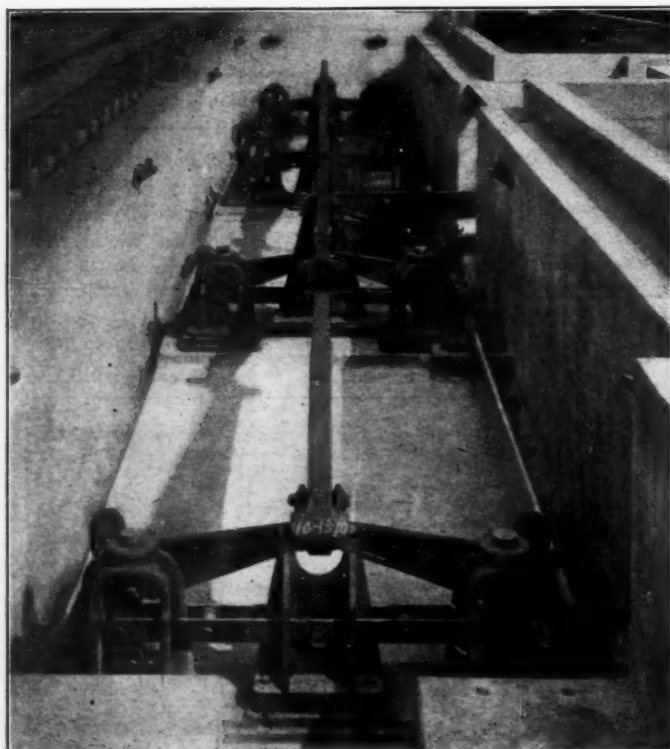


Fig. 5. Torsion Shaft and Toggle Levers for Operating the Relieving Gear.

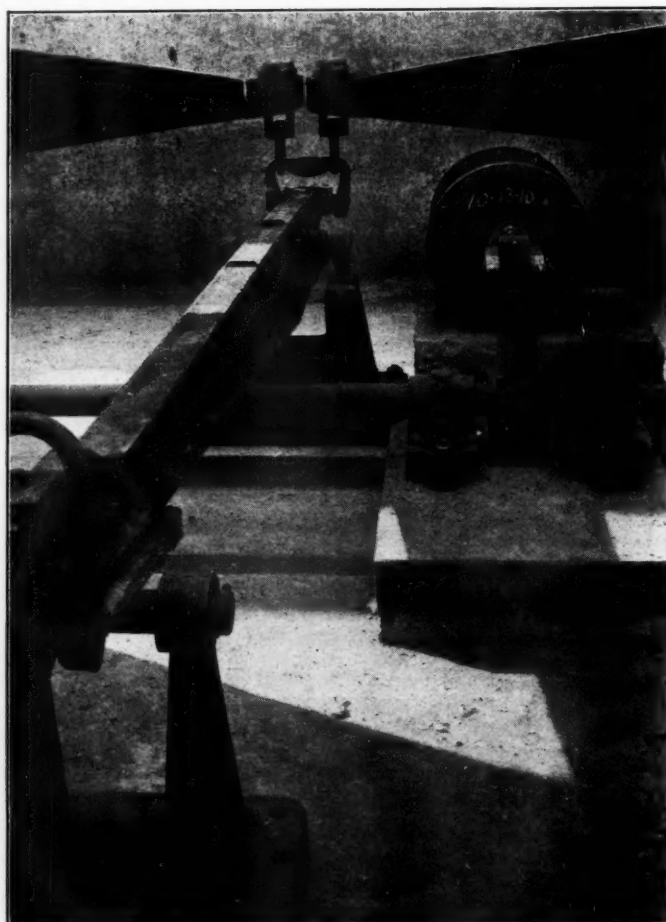


Fig. 6. Cylinder and Torsion Shaft for Operating Relieving Gear; Also Middle Extension Levers Connected



Fig. 7. Ratchet and Toggle for Raising Hump.

West Brownsville Junction is the first to provide a hump structure in which the elevation of the apex of the hump can be definitely adjusted as desired.

The construction of the hump provides for two sets of box chords or girders, amounting to four in all, running parallel with and directly under each rail forming the track overhead. These two sets of box chords are supported at the center (which forms the apex of the hump) by rigid steel castings located parallel with the track, and these are in turn supported by abutments on either side, to which bed-plates are bolted. These same abutments also support on either side (directly under a vertical center line through the rails) two toggle lever jacks of the Sampson screw type, which are universally connected by an extension socket and are operated by a hand ratchet with a lever arm at the center (Fig. 7). At the four ends of the box chords are bolted pivotal castings which are also supported by bed-plates on the abutments. Surfaced hard wood ties are bolted to the box chord system, to which in turn are bolted square cast iron columns which project through the platform covering the top of the inclosure, and to these columns the rails forming

the track over the hump are bolted with rail clips. The present construction of mechanical hump provides for a vertical rise of eight inches at the apex, the latter being located about 25 ft. from the scale.

When the apex is raised to suit the requirements, distance pieces or liners are inserted under the center casting, after which the jacks are released. This method rigidly supports the center casting at the apex at all times, the jacks not being used to support the superimposed load, but merely providing means for raising and lowering the apex. Means are also provided for taking care of the change in the length of rail due to raising or lowering the apex, also any change in the length of the rails on the hump and approach due to expansion and contraction caused by atmospheric changes. This is accomplished by simply placing a bronze friction plate at the base of the four pivotal castings on either end, which permits a free change in a longitudinal direction of the four pivotal castings bolted to the box chord of the scales.

Standard plans have been adopted for heating the vaults of these track scales by a hot water circulating system; also of

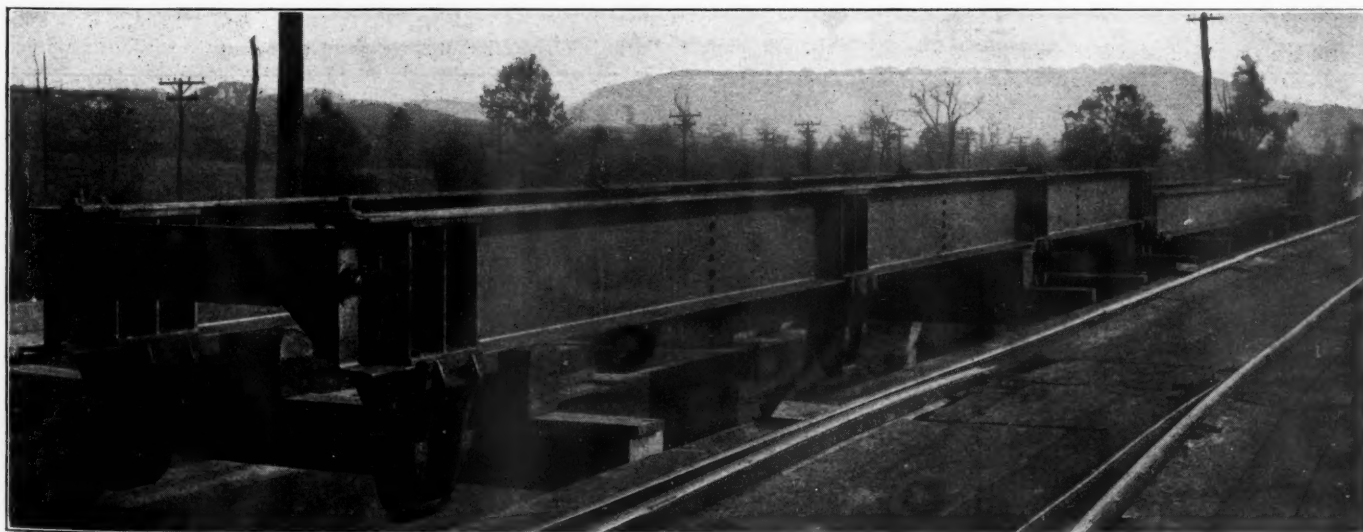


Fig. 8. Metal Bridge and Girder Supports for Mechanical Hump.

the electric lights for lighting the vaults when inspection is to be made, as well as the lighting of the yard in close proximity to the scale. The Pennsylvania Railroad Company is to be commended for having worked out such a substantial and accurate system of track scales as it has opened up a new era

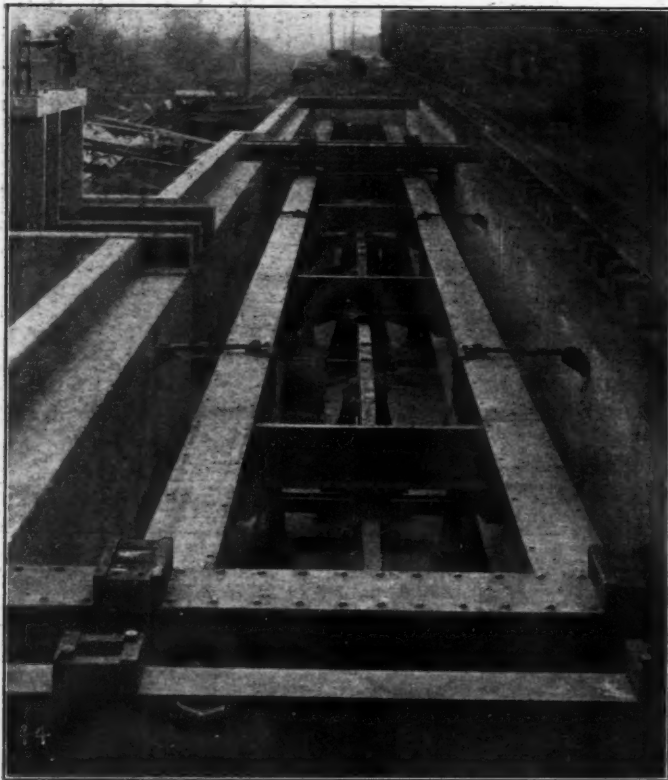


Fig. 9. Method of Checking the Metal Bridge When in Position; Track Scale, Pennsylvania Railroad.

in the weighing of freight cars. Most of the features in this railway track scale have been covered by patents, which were taken out by A. W. Epright, scale inspector of the Pennsylvania Railroad.

FACTORS SOMETIMES FORGOTTEN IN PUBLIC CONTROL OF PUBLIC SERVICE CORPORATIONS.

BY CLARENCE P. FOWLER.
Consulting Engineer.

With our rapid industrial expansion many changes have come in our commercial methods, in order to cope with the new order of things. Not one of the least of these signs of the times, has been the evolution of the corporation, the existence of which has been brought about largely owing to the growing complexity of our business relations, which have given rise to various drawbacks to the conduct of many affairs by individuals or partnerships. As chief among the reasons why individual effort has been supplanted by corporate enterprise, may be mentioned:

- (a) Interruption to business caused by death of the individual or individuals involved.
- (b) The unlimited liability of business men hampers development through the necessity of excessive caution in contracting obligations.
- (c) Economies of operation resulting from concentration.
- (d) Ability to attract and retain the highest order of managerial talent, owing to large scale organization.
- (e) Limitations incident to individual wealth.

It is clear, then, that modern business conditions have created a demand for a new type of enterprise, which the corporation supplies, the public service corporation being a typical example.

In the earlier days, public service corporations were enabled to meet this demand under unobstructive circumstances, as then

new enterprises were so welcome to the public that it received them with open arms. This public attitude is well illustrated by the provisions of the charters granted by the state of Massachusetts to three of the first railways in this country, organized in 1829 and 1830, which stated that "rates of fare and freight, the construction of the roads, the form of cars and all other matters and things in relation to the use of the roads should be wholly within the discretion of the directors." At that time the total railway mileage in the United States was less than twenty-five miles and the public naturally, for many subsequent years, continued to be more vitally interested in the establishment and development of transportation facilities, than in how it could impose new burdens upon these public servants through the agency of governmental regulation and control. This experience of the early steam roads was repeated when the street railway was introduced in 1852, and its successor, the electric railway about 1886; also when the telephone and electric light made their first appearance in commercial use in 1876; for the territories which they served were soliciting their introduction and gave no thought to their regulation.

All this stands out in marked contrast with the state of affairs surrounding public service corporations at present, when governmental control is moving forward with giant strides in practically every part of the United States. In fact, in this connection it is interesting to note that in their messages to the legislatures which have convened since the first of the present year, the governors in practically all of the states have either recommended the formation of public utilities commissions where none now exist or advised enlargement of the powers of existing commissions, and it is now the rule to find public service corporations within the control and regulation of public governing bodies in respect to capitalization, debt, rates, service and general conduct of the business of such undertakings.

Various reasons have been assigned for the difficulties under which public service corporations labor to-day, due in many instances to unbusinesslike supervision, antagonistic legislation and adverse public sentiment. Looking broadly at these differences between the public service corporation and the public it serves, it would seem that while the former, at times, has played the role of the offender, the past few years have witnessed so much antagonistic legislation, in accordance with popular demand, that all concerned have not yet had time properly to digest what has taken place, resulting in much confusion in the public mind.

It is generally conceded that not a little of this agitation has been instigated by those who with selfish motives, seek to provoke prejudice of the public against all corporate interests, irrespective of whether the latter are good, bad or indifferent. It is obvious from this, that if the well-meaning public service corporations would receive fair treatment at the hands of the public it is essential that an endeavor be made to bring the public and the corporations to a better mutual understanding.

Some of the salient features of public service corporations about which the public needs enlightenment are what may be termed economic peculiarities of these public servants. These should be considered in connection with some of the benefits such enterprises confer upon the communities they serve.

An important economic advantage favoring the ordinary manufacturing enterprise as compared with the public service undertaking is that the former makes a *commodity* while the latter renders a *service*. In the case of the public service enterprise, the service furnished cannot, for lack of a present demand, be stored away and kept for a better market. If it is not sold to-day, because no fair price can be obtained for it, it can never be sold. On the other hand, a commodity may be made at a uniform rate of production, with all the attendant economies, and after manufacture it may be placed in storage, and kept until the manufacturer can sell to best advantage.

Another economic feature peculiar to the services rendered by quasi-public enterprises, such as gas, electric light, telephone,

electric and steam transportation companies is that while these services have done much to mold the trend of our civilization, they do not comprise, so to speak, the fundamental requisites of life, such as food, clothing, shelter and fuel, all of which latter things form the basic elements necessary to perpetuate human existence. As bearing upon this question it should be noted that authentic statistics show that the public have for years suffered without comment, the steadily advancing prices of these necessities of life (during which time the average cost to the public of practically all classes of services furnished by our public service corporations showed a marked decline) and still it insists that the best standards of light, communication and transportation be maintained at a further reduction in the rates.

In fact, actual statistics recently collected by a "Cost of Living Commission" in one of our eastern states reveals the fact that public utilities, in general, are conspicuously absent from the list of contributory causes responsible for the growth of the family budget. The results of the investigations of this commission show that the maximum net price charged for gas and electricity in practically all cities in the state subject to inquiry, during the period from 1890 to 1910 have suffered a reduction per unit of service of about 50 per cent., and it is well known that telephone rates have decreased by substantial amounts during the same period. With the street railway the same condition is prevalent. Its fares are stationary, extensions of transfer systems, improved standards of equipment and service, together with lengthened mileage, all resulting in decreased cost of transportation and improved service to the public.

This condition of affairs is all the more peculiar, when one stops to consider some of the further economic advantages that industries, supplying the necessities of life, enjoy when compared with those furnishing public service. This arises primarily from the greater flexibility of the former class of enterprise as compared with the latter, to meet varying conditions. For example, if a manufacturer in times of depression, wishes to economize in expenses he lays off hands and shuts down his plant. Our most recent period of depression supplied ample illustration of the truth of this statement. Again, if a manufacturer finds adverse local conditions becoming burdensome, such as increased taxes or high labor costs, he can, at least as a last resort, move to a locality where circumstances will be more conducive to economical operation. Think of trying to stop operations temporarily in transportation, lighting and communication simply because times are "hard." To carry the idea further it is at once apparent that if a public utility corporation finds labor, taxes or expenses too high in one locality it cannot "move" its property to another possessing more favorable characteristics. Then, again, the field for marketing the manufacturer's product is broad, he being able to ship it to considerable distances, while the public service company may sell its service only to the community it serves and may then be subjected to ruinous competition, in a territory which is incapable of properly supporting even one company.

That the public utilities are subject to further economic limitations not common to manufacturing enterprises will be understood, when it is remembered that the latest and most authentic statistics show that it requires an investment of from three to four times as much capital in the former as in the latter, to produce the same net return, which ratio may be expected to increase with the enactment of additional restrictive legislation.

As a result of this large amount of capital required for establishment of public service enterprises, together with some of the features inherent in the operating expense statement of such corporations, a large part of the total expenditure made is fixed and independent of the volume of business done. It will be seen, therefore, that this unfortunate circumstance tends to further aggravate the condition previously referred to, viz., that the public utility enterprise finds itself debarred from most of the economies, of which other industries can avail themselves in times of necessity.

These examples of the disadvantages under which the public service companies struggle for an existence could be multiplied, but a sufficient number of typical instances have been cited, it is hoped, to indicate their general character. It is important to keep in mind the fact that these disadvantages of the public service company are inherent—a characteristic that the most improved form of equipment and economical management of the highest order, cannot overcome. That these drawbacks, always peculiar to the public service industries, in addition to the steady rise in the cost of operation, have militated against the possibility of obtaining anything like an adequate return on the capital invested in such enterprises is shown by the following figures which may be regarded as typical.

Reliable statistics show that for the last quarter of a century the steam railway stocks in the United States averaged a rate of less than $2\frac{1}{2}$ per cent. per annum. If only the last half of this period be considered, it will be found that the average rate was still well below 3 per cent. per annum. It is significant that in the same period, returns in the states of greatest population, density, and volume of traffic, the average rates were still below 6 per cent. per annum. It may be claimed that the average rate of dividend is low on account of "watered" stock, but the amount of so called "watered" stock is probably counterbalanced, in some degree, at least, by stock that has been destroyed by foreclosures. The capitalization of steam railways in the United States is not much more than one-half as much per mile as the lowest, and not more than one-quarter of the highest capitalization per mile found in the case of European roads. In fact, the railway commission of the states of Minnesota and Washington estimated that the cost of reproducing the roads in their states would be much greater than the capitalization of such roads.

Another serious condition of affairs is indicated in the electric railway industry of one of the most densely populated New England states. The official commission's preliminary report for nine months ending June 30, 1910, shows that out of 78 companies reporting operations, only 35 paid dividends and only 5 paid 7 per cent. or over, only one paying 10 per cent. The operation of these roads was directed by a high grade of managerial talent, as is evidenced by a systematic reduction in the operating ratio; and that cultivation of traffic was evident is shown by the increased gross receipts per car-mile.

Surely most of the rates of dividends just quoted can hardly be said to constitute fair compensation to investors in these enterprises for the risk they take; and if the service of additional capital is to be freely enlisted for the creation and development of these necessary public service industries, they must not be unnecessarily hampered by unreasonable governmental restraint, but must be afforded every reasonable opportunity for economically conducting their businesses. It is not natural to expect that an investor will willingly take the risk of putting his funds into the stock of a new public service enterprise and pass patiently through the earlier years of unprofitable exploitation, only to find that when the property has reached the successful stage he is limited to a rate of return upon his capital which is little better than savings bank rates.

It should be further borne in mind that any arbitrary legislation which reduces the income below a reasonable return adversely affects the interests of the small investor, as the general public holds a large proportion of the securities of the public service undertakings.

The many conveniences enjoyed by the public through the services furnished by various public service corporations have now become so common-place that the public gives little thought to the many ways that these enterprises have been its benefactor.

The vast territory of the west and south would still be a wilderness if pioneer railways had not developed it. Without the widespread efficient service which railways are rendering today, land values in these states would be vastly less than

they are. Not only did the railways push their tracks through wide areas of uninhabited prairie land and then fill up the country with settlers, but they stood by these pioneers in solving the hard problems of agriculture in an arid soil. Free seed was distributed, by the roads, experimental stations established and farmers taught what and how to plant. In the southwest the railways helped the farmer fight the grasshopper and drought. In the northwest they helped him to select seed and raise the best wheat in the world.

Without fast freight and refrigerator cars live stock and perishable fruits from the west could not have endured the long journey east, and an inexhaustible market would not have been opened up to the west. To-day a number of western trunk lines are running fast freight trains at short intervals, almost on passenger schedules, to enable the shipper to deliver his fruit in Chicago in first-class condition and obtain high prices. No less important have been the achievements of the roads of the eastern half of the United States, which have taken the products gathered by the western roads from the farms and forests, and distributed them to the markets and consumers of the east. As American progress and prosperity rest mainly on the growth of her agricultural production, the importance of the work of bringing the new lands into cultivation and increasing the productivity of the old, made possible through adequate transportation facilities, can be hardly overestimated.

Consider, now, some of the monetary and sociological advantages that accrue to communities served by the electric street railway.

By the extension of modern systems of rapid transit the value of outlying real estate is increased, thus adding to the amount of assessable property, thereby tending to act, as a check upon the increase in the local tax rate. It is interesting to note that the outlying portion of one of our largest metropolitan centers grew over 1,000 per cent. in value from 1882 under the cable car system to 1909 under the electric street railway. This same extension of lines also results in an advantageous redistribution of population by lessening its congestion, which in turn results in greater ownership of homes, securing of low rental with better sanitation, which means a lower death rate. As bearing upon this matter it is interesting to note that recent statistics show that the street railways serving some of the larger centers so actively pushed their lines into sparsely settled territory during the period from 1902 to 1907, that they show considerably decreased earnings per mile of track. The trackage reported by companies in the above class in 1907 was 87.7 per cent. greater than the trackage reported for 1902 with an increase of only about 75 per cent. in gross receipts.

It should be further pointed out that the value of the time saved as a result of modern rapid transit, by the total number of passengers carried, even when estimated at a very conservative rate, would total up to a sum of vast proportions. The redistributing power of the wages and salaries of a large number of employees is an invaluable asset to any community, and, as with other gigantic undertakings, the large amounts spent by street railways for maintenance and renewals contribute largely to the general prosperity.

In conclusion, it may be said that in a discussion of this length it is, of course, possible to touch only some of the "high spots" of so broad a topic, but an endeavor has been made to show that public service corporations, even under the most favoring circumstances, are, owing to their very nature, at a decidedly economic disadvantage when compared with other forms of enterprise, not to mention the good they do for the communities they serve.

In all fairness to these undertakings, it would therefore seem that what is most needed today is a better appreciation of these and other facts, by the public, which is not an unreasonable body and which, it is believed, would, with a better understanding of the situation, set its stamp of approval upon wiser legislation to the end that there may be a nearer approach to the conservation of all interests concerned.

THE IMPORTANT FUNCTION OF THE ACCOUNTING DEPARTMENT.

The rate controversy has brought into court as never before, the railway income accounts. Its factors have been under closest scrutiny. Theories of public railway policy have been evolved on this as a text. This income account is the especial custody of the Accounting Department, which is charged with gathering the myriad items that go into its totals, verifying those items, classifying and accumulating them to grand totals and certifying to these totals. With the greater attention to the detail significance of this income account, the duties of the department compiling it are receiving greater emphasis.

The function of the Accounting Department is to *make* and to *keep the records* which are the inventories of property and transactions affecting the values of property. The department is the outgrowth of the "Auditor" function. The Auditor's first concern is with cash and money values, and from this, the scope of his work widens to include things of indirect money significance. Before taking into his records a property or a transaction affecting his property he audits the transaction, that is, he identifies it against a specific authorization of the organization, and next he identifies it against average practice. This is the process of *auditing*. Incidental to this operation are developed the functions of *accountancy*, which is the method of gathering facts and grouping them by factors to verify them. Still further as an incident of auditing, in order to identify a thing against average standards to locate inefficiencies, the auditor develops the *statistical* method, which differs from the accounting in that the groups are now by one factor and now by another until there is inductively involved the principle of classification for each set of facts.

The auditor as record man comes to bear the relation of the court of review to the rest of the organization. He reaches to every part of it; he is in touch with all rules and regulations which in a subordinate way define authority, and also with all standards of efficiency which qualify the acts under specific authority. His function carries back to the highest seat of authority—namely, the president, the board of directors, the stockholders and the state. This recognition of his position is established in the Interstate Commerce law when it provides that the commission, through its statistician, shall prescribe the forms of all accounts and shall permit no accounts except by this authority. Such a conception of the function of the auditor for the public is carried over into the railway organization to give a defined status to that part of the organization which performs that function for a particular road. The growth of the idea is necessarily slow, and different on different roads. On some the "Auditor" has not advanced beyond the position of a "necessary evil" whose prerogatives have been grudgingly yielded by a sort of usage rather than by specific definition, and are limited to those phases about which there can be no dispute—such, for instance, as watchfulness over the cash accounts of the railway and responsibility for accounting in certain routine ways for revenues and disbursements. At inventory time he may or may not be recognized as a factor. Gradually as a matter of convenience to the operating offices he may accumulate a file of contracts whereby he clerically checks disbursements.

On other roads his definition of function has been more specific and more embracing, but this definition has been made by the President, and therefore, at last, the activities of the "Auditor" are limited to the consent of the President. On other roads still, this authority is carried up to the form of a specific resolution of the Board of Directors; for it may be embodied in a by-law of the corporation, and finally, the "Auditor's" status has now come to be defined, so far as responsibility is concerned within certain area, by the requirement that he shall personally swear to the exhibits which he makes.

Having arrived at this point of ultimate court in stating in the balance sheet and income account of the road, what is and what is not, the next stage is to give the "Auditor" facility, with a

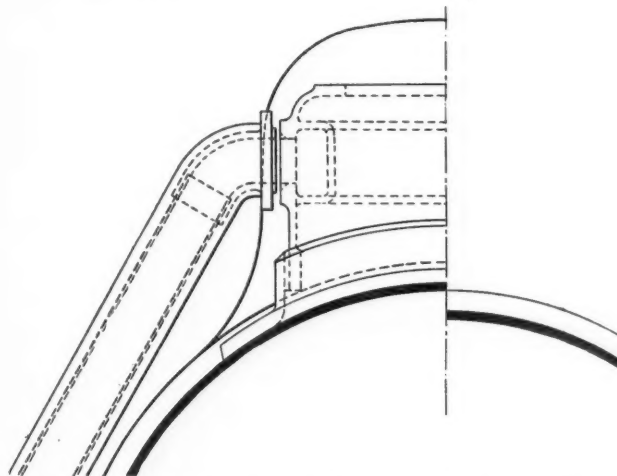
larger organization, to verify his figures at each stage of their compilation. That is, to give official status to his prerogative as accountant and statistician whereby he may by any method of evidence which is found available, prove to his own satisfaction the facts which he records; and this is *accountancy*. Furthermore by proper means he may determine qualifying factors; and locate, for the benefit of the executive, the board and the public, the efficient and inefficient phases of operation according to well-established standards of practice; and this is his function as *statistician*.

The character of his work on the one hand as a gatherer of data for his totals, embraces the whole scope of operations regardless of departmental lines, and also extends, so far as may be found desirable, to the first source of information, to the actual contact with men and conditions from which his records are made. And on the other hand, because his facts are, in different stages, information of value for every part and grade of the organization, his compilations should be accessible from the lowest to the highest ranks, and as a by-product of his work he becomes a ready index to these facts—a student of their significance, and by that token a Counselor in the formulation of the ultimate policies of the road. * * *

HEAVY LOCOMOTIVES FOR NATAL GOVERNMENT RAILWAYS.

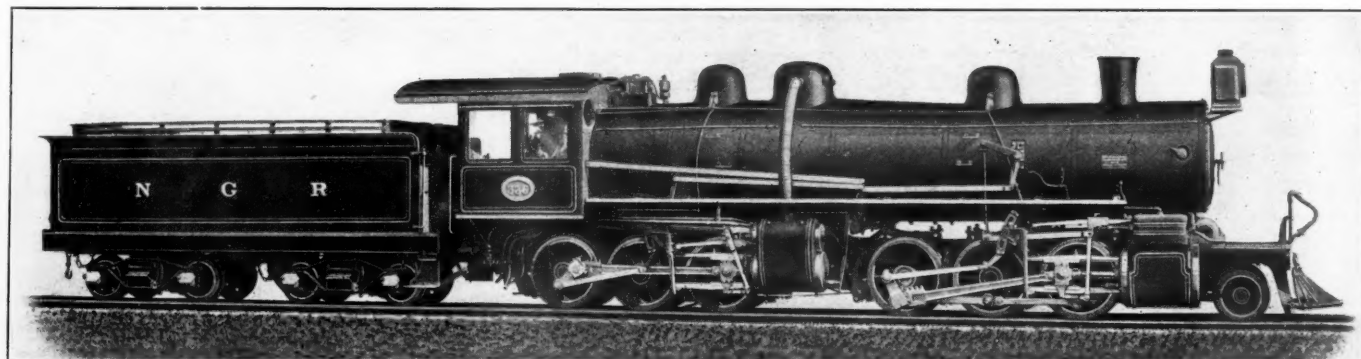
The Natal Government Railways of South Africa have two heavy experimental locomotives in service that were built by the American Locomotive Company, one being of the Mallet and the other of the 4-8-2 type. The work that has been done in

of France, the wheel arrangement of which also included a leading truck. In this design of cylinders, the exhaust passages



Steam Pipe Connection at Dome; Mallet Locomotive.

are so arranged that the steam exhausts through openings in the front of each cylinder casting into a Y pipe which is connected to the exhaust pipe in the smoke box by means of elbows and a pipe fitted with a slip joint. This arrangement was necessary in order to increase the length of the exhaust pipe so as to reduce the angle of its deflection when the locomotive passes through sharp curves, which on some parts of the line have



Mallet Locomotive for Natal Government Railway.

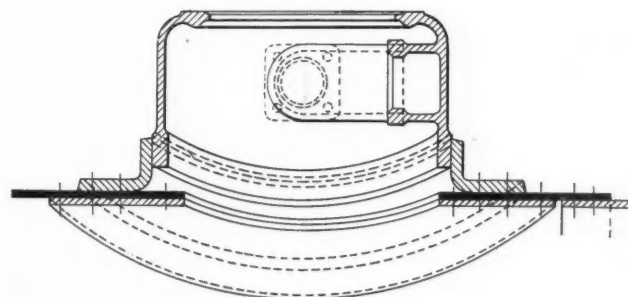
this country with the Mallet locomotives and their restricted construction to heavy designs, is apt to cause one to overlook the fact that M. Mallet originally intended his design for light railways, so that an expression of surprise at the adaptation of the Mallet locomotive to narrow gage work is not well founded. The gage of the Natal Government Railways is 3 ft. 6 in., and these locomotives are the heaviest of their class that have been put into a service, which is necessarily severe because of the heavy grades, rising to 3.3 per cent. As heavy Mallets go, the locomotive is not very large; it weighs only 196,000 lbs., and has a tractive effort of but 46,600 lbs.

In general both locomotives follow American practice in their design, although they have a number of purely English features, such as copper fireboxes and staybolts, bronze driving boxes and the automatic vacuum brake on the tenders. Except for the application of the two-wheel leading truck, the design, as far as the characteristic features are concerned, follows the builders usual practice for this type of locomotive.

The high pressure cylinders are 17½ in. in diameter by 26 in. in stroke, and are equipped with piston valves, while the low pressure cylinders are 28 in. in diameter, and are equipped with Allen-Richardson slide valves. The low pressure cylinders are similar in design to those of the Mallet articulated compound locomotives built by the same company for the Eastern Railway

radii as low as 300 ft. In order to provide room between the bottom of the smoke box and the top of the low pressure cylinder castings for the flexible exhaust pipe connections, it was necessary to flatten the bottom of the smoke box so as to give an offset of 5 in.

Both high and low pressure valves are operated by the



Steam Dome; Mallet Locomotive.

Walschaert valve gear and the arrangement of the reversing mechanism is such that the link block of the high pressure gear is lowered while that of the low pressure gear is raised when being thrown into forward motion. In this way the weights of the

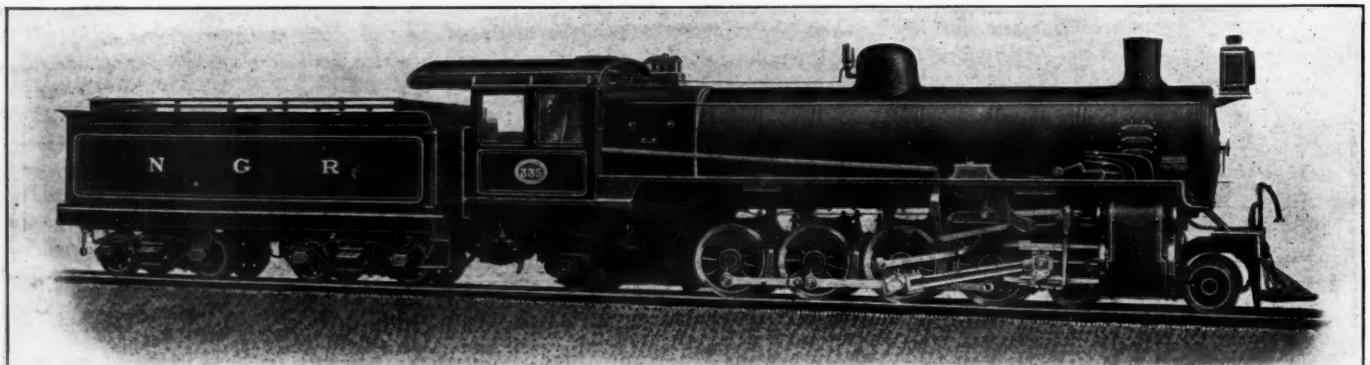
parts of the two sets of valve motions counterbalance each other. As the high pressure valves have inside admission, and the low pressure outside admission, the eccentric cranks lead their respective main pins in both sets of valve motions. Reversing is effected by means of a screw and hand wheel. Wrought iron frames 4 in. wide are used throughout, and there is a single articulated connection between the front and rear engines. That part of the weight of the boiler which is carried on the front system, is supported by a single self-adjusting sliding bearing which is located between the first and second pair of driving wheels.

The 4-8-2 type locomotive is fitted with a superheater and the steam pressure is cut down to 160 lbs. on that account. The superheated steam is distributed to the cylinders by 11 in. piston valves. The Walschaert valve gear is operated by a reversing screw and hand wheel. The boilers are of the extended wagon top type for the Mallet and the straight top with a Belpaire firebox for the 4-8-2 types. In the Mallet locomotive the dome is a steel casting with a steam belt running around the front half having openings at the side for the high pressure steam pipe connections. On the center line there is an opening for the throttle, as shown on the engraving which is reproduced herewith.

The barrel of the boiler measures 66 in. in diameter at the front end and is fitted with 172 2¼-in. tubes and 15 5¼-in. tubes which contain the superheating pipes. The tubes are 18 ft. 9 in. long and the total heating surface of the boiler is 2,417

Following are the principal data and dimensions for these locomotives:

General Data.		
Type	4-8-2	2-6-6-0
Service	Freight	Freight
Fuel	Bit. coal	Bit. coal
Tractive effort	41,320 lbs.	46,600 lbs.
Weight in working order	172,000 lbs.	196,000 lbs.
Weight on drivers	126,700 lbs.	179,500 lbs.
Weight of engine and tender in working order	271,200 lbs.	295,200 lbs.
Wheel base, rigid	12 ft. 9 in.	8 ft. 4 in.
Wheel base, total	22 ft. 6 in.	33 ft. 2 in.
Wheel base, engine and tender	49 ft. 7 in.	60 ft. 2¾ in.
Ratios.		
Total weight ÷ tractive effort	4.16	4.20
Weight on drivers ÷ tractive effort	3.61	3.85
Tractive effort × diam. drivers ÷ heating surface	778	832
Tractive effort × diam. drivers ÷ equivalent heating surface*	637	.....
Total heating surface ÷ grate area	68.2	63.6
Total equivalent heating surface* ÷ grate area	83.5	.....
Firebox heating surface ÷ total heating surface, per cent.	6.16	4.9
Firebox heating surf. ÷ total equivalent heating surf.,* per cent.	5.05	.....
Weight on drivers ÷ total heating surface	52.4	70.5
Weight on drivers ÷ total equivalent heating surface*	42.9	.....
Total weight ÷ total heating surface	71.16	76.9
Total weight ÷ total equivalent heating surface*	58.20	.....
Volume equivalent simple cylinders, cu. ft.	12.54	11.44
Total heating surface ÷ vol. cylinders	192.17	222.6
Total equivalent heating surface* ÷ vol. cylinders	235.5	.....
Grate area ÷ vol. cylinders	2.82	3.51



Experimental 4-8-2 Type Locomotive for Natal Government Railway.

sq. ft., of which the tubes contribute 2,268 sq. ft. and the firebox the remainder. The superheater is of the firetube type, with side headers, and has a heating surface of 358 sq. ft. Full advantage has been taken of the opportunity afforded by the use of trailing wheels to provide a deep firebox.

The trailing truck is of the radial outside bearing type and the design is of a modification of that previously used by these builders. This modification consists principally in the elimination of the supplementary frames and the use of a special design of spring saddle guide, thus simplifying the construction. The semi-elliptic spring which transmits the load to the journals, rests on a spring saddle, which in turn rests on a sliding plate provided with a circular boss which fits into a recess in the top of the journal box. A projection on the bottom of the spring saddle fits into a diagonal slot in the top of the sliding plate. This slot is at right angles to the line passing through the radius bar pin and the center of the box, thus serving to keep the truck in positive alinement at all times and also to relieve the radius bar of undue strains. The spring seat is guided vertically between the jaws of the cast steel spring saddle guide, which is rigidly bolted to the rear frame. The trailing truck is equalized with the rear driving wheels and all the driving wheels on each side are equalized. An interesting feature of the design, which differs from American locomotive practice, will be noticed in the use of plain tires on the leading driving wheels. The engine truck is of the three point suspension swinging bolster type and is designed to give a lateral play of 4 in. on each side of the center.

Cylinders.		
Kind	Simple	Compound
Diameter	24 in.	17½ in. and 28 in.
Stroke	24 in.	26 in.
Valves.		
Kind	Piston	{ Piston and Allen
Travel	5½ in.	{ Richardson
Steam lap	15/16 in.	5 in. and 5½ in.
Lead, forward gear	¼ in.	1 in. and ¾ in.
		3/16 in.
Wheels.		
Driving, diameter over tire	45½ in.	45½ in.
Driving, journals, main, diam.	9 in. x 10 in.	8 in. x 10 in.
Engine truck, diameter	28½ in.	28½ in.
Engine truck, journals	5½ in. x 9 in.	5½ in. x 9 in.
Trailing truck, diameter	30 in.	.....
Trailing truck, journals	6 in. x 12 in.	.....
Boiler.		
Style	Belpaire	Ext. wagon top
Working pressure	160 lbs.	200 lbs.
Outside diameter of first ring	66 in.	65½ in.
Firebox, width and length	63 in. x 81 in.	60 in. x 96 in.
Firebox, plates, thickness	½ in.	½ in.
Firebox, water space	4 in. and 3 in.	4 in. and 3½ in.
Tubes, number and diameter	{ 172-2¼ in. }	230-2¼ in.
	{ 15-5½ in. }	
Tubes, length	18 ft. 9 in.	18 ft.
Heating surface, tubes	2,268 sq. ft.	2,422 sq. ft.
Heating surface, firebox	149 sq. ft.	125 sq. ft.
Heating surface, total	2,417 sq. ft.	2,547 sq. ft.
Heating surface, superheating	358 sq. ft.	.....
Heating surface, total equivalent* ..	2,954 sq. ft.	.....
Grate area	35.4 sq. ft.	40 sq. ft.
Top smokestack, above rail	12 ft. 6 in.	12 ft. 5½ in.
Tender.		
Wheels, diameter	30 in.	30 in.
Water capacity	4,000 gals.	4,000 gals.
Coal capacity	9 tons	9 tons

* Total equivalent heating surface equals total heating surface (2,417 sq. ft.) plus 1½ times the superheating surface.

General News Section.

Passenger trains of the Missouri, Kansas & Texas now run to and from the new Union Station at Houston, Texas.

The public utilities commission bill and the anti-pass bill introduced in the Utah legislature have both been defeated in the senate.

Suit has been begun by the Government in the Federal Court at St. Louis against the Wabash Railroad, to recover penalties for 53 violations of the federal law limiting the hours of work of trainmen.

The American Express Company has established at Los Angeles, Cal., an industrial department. It is in charge of Wm. H. Lovesay. This department, for the benefit of farmers and fruit growers, is claimed to be the first of the kind ever created by an express company.

Five Mallet locomotives, each weighing 461,000 lbs., which is said to be 51,000 lbs. heavier than any locomotive now in service, have just been shipped to the Baltimore & Ohio from the Schenectady works of the American Locomotive Company. The tender weighs 181,000 lbs. loaded, making the combined weight of the engines and tender 642,000 lbs. The new locomotives will be used on the mountain division.

The strike which was declared some weeks ago by the Brotherhood of Locomotive Engineers on the Southern Pacific Lines in Mexico and the Sonora Railway has proved a complete failure. The roads employed Mexicans to take the places of the Americans who quit work, and the former employees have withdrawn from the scene and have sought employment on the Southern Pacific and other roads in the United States.

The California State Railroad Commission recently issued an order reducing from \$6 a day to \$3, the rate to be charged as demurrage on delayed freight cars, but subsequently it was decided to further consider the question, and the order has been vacated. Under the new railway law of California, which was noticed in the *Railway Age Gazette* of February 17, page 324, the commission has full power to fix demurrage rates and also to prescribe regulations in regard to the collection of demurrage.

The stockholders of the Union Switch & Signal Company at their annual meeting this week adopted a profit sharing plan. The directors were authorized to sell or otherwise dispose of 2,000 shares of the authorized and unissued common stock to or for the benefit of such employees whether stockholders or not (excluding directors and general officers) as the board shall deem proper. The directors have the power to fix the price, not less than par, and to make all suitable conditions and regulations.

The California legislature has started already to amend its new railway law—again illustrating that as long as a legislature is in session nothing is safe from disturbance. The senate has passed an amendment adding to the list of those who may be granted free passes executive officers of mercantile organizations traveling for the advancement of trade or development of industry, and another empowering the commission to require one railway to switch to private tracks of shippers on its own line, the cars of a connecting railway, and to regulate compensation for such service.

The unfilled tonnage of the United States Steel Corporation at the close of February was 3,400,543 tons compared with 3,110,919 tons at the close of January. The increase in February over January was 289,624 tons, which is less than the gain of January over December, which was 436,162 tons. This, however, is explained by the fact that the shipments in February were 29,000 tons a day compared with 24,000 tons a day in January. Had the shipments been the same in both months the February increase would have exceeded the gain of January. The February unfilled tonnage was greater than any month since last August, when it was 3,537,128 tons.

The amounts set aside annually for pension allowances for employees of the Pennsylvania and controlled lines east of Pittsburgh and Erie now aggregate more than \$850,000. The number of employees entitled to pensions on December 31 was 2,505.

The Pennsylvania basis for payment of pensions provides that there shall be paid for each year of service 1 per cent. of the average regular pay for the ten years immediately preceding retirement, the monthly allowance being determined by ascertaining the total amount of wages the employee actually earned and for which he was carried on the pay-rolls during the ten year period, and dividing that amount by 120 calendar months.

About 1,000 drivers and helpers of the Adams Express Company in New York City, struck and left their work last Saturday on the ground that the company had not kept the agreement which was made in the settlement of the strike which occurred several weeks ago. The company seems to have moved nearly all of its perishable freight without much delay, and by the fourth day it was said that the strikers were beaten. There was a good deal of violence in the streets and a number of drivers were wounded by stones and other missiles. Officers of the company declare that the dismissal of three men, which seems to have been the cause of the strike, was because of flagrant misconduct.

The Baltimore & Ohio has lately set up a large number of new machines in its Baltimore shops and in connection with the installation of the new machines, improved methods of safeguarding the men employed to operate them were adopted. Exposed parts of the machinery that would in any way jeopardize the safety of the mechanics have been protected so that it is almost impossible for a man to come in bodily contact with them. Guard rails have been built to enclose belting, and exposed gears have been encased under metal covers. Notices have been posted on these guard rails that it is against the rules for employees to oil, adjust or repair tools while running. The large traveling cranes have been equipped with gongs as a protection to employees. All elevator shafts have been protected by guard rails and automatic drop gates. The foremen of the shops have been instructed to keep aisles free from obstructions. These methods for the protection of men are being carried out at all the shops on the road. Bridges are being equipped with safety platforms for the protection of men working on the track.

White firemen employed by the Cincinnati, New Orleans & Texas Pacific went on a strike on March 9 in pursuance of an order from a committee of the Brotherhood of Firemen. The action was taken after a long conference with Vice-President T. C. Powell. While the brotherhood representatives were ordering the strike Mr. Powell was telegraphing to Washington asking for mediation by the federal authorities under the Erdman act. The union officers declined to join the railway in asking for mediation, asserting that their experience had led them to believe that the men would lose by it. The strike is due to a dispute regarding the status of negro firemen. The union holds that they shall not be employed except on local and slow freight trains and yard engines. The railway maintains that the negroes are entitled to work on the same terms as white men. Press despatches of Sunday, Monday and Tuesday reported that there had been a good deal of shooting along the line and that nine men had been killed, including negroes employed as "strike breakers," and two detectives. Enginemen were afraid to stay on their engines and it was with difficulty that passenger trains were kept running, even with heavy guards. The company brought large numbers of detectives from St. Louis and asserted its determination to maintain its right to employ negro firemen. The railway company offered a reward of \$500 for the arrest and conviction of any person interfering with the traffic of the road. At Kings Mountain, Ky., several trains were stopped by a so-called vigilance society and the men in charge intimidated. Two of the fatal shootings occurred at this place. From a report from Somerset on Tuesday, it appeared that twelve men had been badly injured in conflicts along the line on that day. W. S. Carter, head of the Firemen's Brotherhood, held a long conference at Washington with Judge Knapp.

"Ready-Made Farms."

According to an officer of the Canadian Pacific, the scheme by which that company has induced settlers to take up new lands in western Canada, by making preparations for them

beforehand, is being introduced in South Africa and Australia. The applications presented at the Canadian Pacific offices for these farms come in faster than they can be supplied. As adopted for introduction in Australia, the plan provides for setting apart farms of 100 to 160 acres each, and building fences around such parts of the land as may be necessary; then 10 acres will be prepared for planting cotton; a house will be built and a well dug, and each settler will be supplied with a cow, some poultry and enough seed for the first year. Payment will be made in ten annual payments.

Possibilities of Hertzian Waves.

The frequency of the electrical waves sent out by some forms of wireless transmitters approaches a million per second, and by either an increase in the amplitude of these vibrations or by a more sensitive receiver, the distance over which these waves (which undoubtedly extend to an infinite distance) may be recorded, can be greatly increased.

In an experiment made by Doctor Peter Cooper Hewitt with powerful wireless transmission apparatus, including a mercury vapor interrupter, it was found that the effect of the high-frequency discharge upon the iron in the building occupied, such as water and heater pipes, quickly produced incipient fires within the room where the apparatus was erected, thus demonstrating the wonderful power of this incomprehensible force and suggesting great possibilities in the transmission of electrical energy without wires.

The transmission of electric energy without wires will be especially valuable for signaling purposes and for the control of machinery at a distance.—George Westinghouse, before Southern Commercial Congress.

Proposed Freak Legislation in Texas.

An officer of one of the railways in Texas has sent us a copy of a bill recently introduced in the senate of that state, which he believes "takes the palm" among all the freak measures that have been introduced in that state. It is Senate Bill No. 218, and is entitled "An Act to render more equitable the relations between master and servant." Its provisions, summarized, are that any employer who shall engage an employee "with the intention of keeping him in such service for any indefinite length of time and shall not make a specific date when such service shall terminate, but shall keep such employee in such industrial relation by holding out to him inducements in the way of promotion, advancement or other forms of apprentice agreements and contingent emoluments, shall use due diligence to keep such promise, and shall at any and all times be held amenable to the rulings of the proper civil court for the equitable adjudication of such emoluments when such employee shall bring into the proper court a properly certified statement of such services. . . ." It is further provided that the operation of the act shall not apply to contracts where the considerations to be rendered by both parties shall have been definitely stated both as to volume and quality.

Value of the Static Transformer.

Twenty-five years ago it was the general conviction that electricity would be limited to local use in the lighting of densely populated districts or the supply of power to adjacent factories, but it was demonstrated that considerable electric power could be cheaply transmitted if means could be found to utilize safely high-voltage current. It often happens, when something is greatly needed for any great purpose, that invention or discovery meets the demand, and so it was in the matter of invention and discovery which gave us a simple static device, consisting of two coils of copper wire surrounded by sheets of iron, which could, without an appreciable loss of energy, transform alternating electric currents of high voltage and small quantity, dangerous to life, into low voltage currents of large quantity, safely available for all power, light, heat and other purposes.

To the part I took in bringing forward in the '80's of the last century the alternating current system of electric generation and distribution, I owe much, if not all, of the reputation accorded to me as one of the many pioneers in what is now a great and important industry. The introduction of alternating current apparatus was bitterly opposed by those who were then exploiting

direct current apparatus, and legislation was sought to prohibit its use because of its alleged danger to life. This incident shows that restrictive laws are not always advantageous, for had the legislation sought for by the opponents of the alternating current system been secured and enforced, I would not now have any justification for this address, because the influence of electricity in the development of the South would be too unimportant to entitle it to consideration on this occasion.—George Westinghouse, before Southern Commercial Congress.

Recording Depreciation on Rolling Stock.

Keeping equipment depreciation accounts, as a whole or by series, is unsatisfactory in many ways and offers no check on mistakes that may be made by neglecting to write off equipment retired from service, or to make proper entries for cars converted from one class to another. By the use of the form shown here, it is an easy matter to obtain at any time the value at which any car is carried upon the books and also the amount of accrued depreciation. These forms may be kept either on cards or preferably as sheets in a loose-leaf binder, indexed according to car numbers.

When equipment is built or purchased, a form is made out for each car and the amount charged to additions and better-

Form D-20-10-10		NORTH & SOUTH RAILROAD		EQUIPMENT DEPRECIATION RECD	
CLASS		Hopper Bottom Steel Gondola.		No. 26487	
RECORD VALUE	\$ 926.70	DEPRECIATION ACCRUED AT 5 %			
ESTIMATED SCRAP VALUE	1908	---	---	FORD	
DEPRECIATION REQUIRED	1909	46	54	1911	
	1910	46	54	1912	
BUILDER	Railway Steel Car Co.	1911		1913	
CAPACITY	100,000 #	1912		1914	
OWNER	City Trust Co. S. E. S.	1913		1915	
PLACED IN SERVICE	July 1, 1908.	1914		1916	
		1915		1917	
		1916		1918	
RETIRED FROM SERVICE		1917		1919	
DISPOSITION		1918		1920	
		1919		1921	
		1920		1922	
		FORD		TOTAL	
		YEAR	END	JUNE	30TH

ments is entered as the record value. The life of the car is then estimated and the annual rate of depreciation ascertained. One-twelfth of the annual depreciation is thereafter charged monthly to operating expenses and credited to the replacement fund. The accrued depreciation for each car is entered upon the form but once each year, and at that time the total of the depreciation columns of all the sheets, should of course, correspond with the general ledger account "reserve for accrued depreciation," likewise the totals representing record value should agree with the sum of the ledger accounts, "Cost of Equipment to June 30, 1907," and "Cost of Equipment since June 30, 1907."

Philadelphia Street Car Service.

Ford, Bacon & Davis, of New York, have filed with the State Railroad Commission of Pennsylvania a pamphlet summary of their report in the matter of the complaints filed at various times against the service rendered by the Philadelphia Rapid Transit Co., operating street surface, elevated and subway railways in Philadelphia. This firm was commissioned on May 27 last to make an examination of the service and equipment, and in its detailed report to the commission it presents a series of tabulated statements, maps and diagrams, representing the principal features of the information gathered and forming the basis for the conclusions and recommendations contained in the summarized report.

In brief it is found that the Philadelphia company's car equipment and rush-hour car service is inferior to that furnished by companies operating in cities of as large and larger population, notably New York, Brooklyn, Boston and Chicago. In their observations covering a period from July 12 to February 1, 1911, they find that the company runs in winter about 39 per cent. more cars, and in summer about 45 per cent. more cars during the evening rush hour, than on its schedules for the middle of the

day, whereas other large transit companies have as many as 100 per cent. more cars in service during the rush hours than in the middle of the day. They find the seating capacity of the cross-seat cars which are used in Philadelphia to be 40 and the standing capacity 29, or a total of 69. If equipped with large prepayment platforms this total capacity could be brought up to 76, bringing the standing capacity up to from 75 per cent. to 90 per cent. of the seating capacity; and it is recommended that the company furnish sufficient rush-hour car service to bring the capacity up to this basis. To provide the service as recommended the company would require 2,265 cars, or 489 cars more than it now has. Of the 3,292 cars owned by the company about two-thirds are of the small single-truck type; that is to say, about 70 per cent. of the total equipment is unsuited to present conditions. The experts criticize the general plan of seating, etc., in the Philadelphia standard pay-within cars, and recommend the equipment of all surface cars with mechanical sanders, automatic wheel-guards and non-projecting draw-heads. They estimate that at least 100 more cars per year will be required to provide for the growing traffic. The experts also submit a tentative plan of rerouting cars throughout the city.

Need of Consolidation of Industrial Enterprises.

The advantages of co-operation in the development and supply of electricity cannot be overestimated. Further co-operation in this great work for the benefit of the public, if not voluntary in the future, should, in my opinion, be an enforced one, notwithstanding the outcry which has been raised by the ill-informed with reference to an imaginary monopolization of the water-power of the nation. Encouragement should be given to the investment of capital in the development of these enterprises under wise and reasonable regulation.

In the larger industrial developments which I foresee for the South there are other important factors which equal in importance the development of the waterproof resources. I have particularly in mind those existing restrictions which make it difficult and expensive for a small corporation to carry on conveniently and in a simple manner its business with ramifications in several states, which restrictions, however, the great corporations of the country can easily surmount by reason of their financial ability.

A Federal Incorporation Act, which the President advocates, under which all companies doing an interstate business could organize, would be a solution of difficulties which are now almost insurmountable, and which are being added to in an alarming manner in the endeavor of the legislatures of the several states to curb a few of the tens of thousands of companies and firms doing an interstate business.—*George Westinghouse* at Southern Commercial Congress.

Our Government Railway.

The medicine which the government applies to the railway business is not the medicine which it takes itself, as appears from the redistribution of the freight rate via Panama. For four years the total annual freight across the isthmus both ways averaged 46,000 tons, but this year 51,000 tons moved in one direction in four months, and 49,000 tons in the other direction. In other words, the business is growing, and the profits ought to be rising. The railways have been told that they ought to look to this for their larger expenses, and that they ought not to advance rates when their business is growing, and the cost per unit is falling.

But Uncle Sam thinks otherwise regarding his railway. He has been collecting 30 per cent. of a rate of \$8 per ton for everything moving. He now substitutes commodity rates, and takes 40 per cent. as his share, thus reducing the share of the connecting steamship lines from 70 to 60 per cent. The reason is that he is embarrassed by his own prosperity. The connecting steamship lines are in a war with the Tehuantepec route, and reduced their rates to such an extent that the Panama railway had more business than it could do and take care also of the canal business. So it was thought that a reduction of the shares of the connecting steamship lines would give them less leeway to cut rates . . . The cutting of rates by any member of a pool to which the United States belongs is something which we hesitate to characterize.

The government shows good business management also in prohibiting the private carriers from competing with the govern-

ment steamship line. They are allowed 22 per cent. of the commodity rate, but they have not yet received permission to run to Philadelphia. The Panama railway holds that Philadelphia is within its sphere at the port of New York, and wishes to reserve New York, including Philadelphia, for itself. Far be it from us to criticize anything the government does to get the money it needs. But the government wants different treatment for its railways from that administered by the Interstate Commerce Commission. By the way, why was not this matter brought before the commission, the decision delayed for ten months instead of being rendered after a talk among gentlemen, and a result reached which surprised everybody?—*New York Times*.

Alaska's First Railway.

On March 15 the Copper River & Northwestern was formally opened. This is the first truly Alaskan railway, if we except the short Canadian White Pass and Yukon mining road; the latter merely enters Alaska for a few miles near Skagway.

The Copper River & Northwestern runs from Cordova bay for 200 miles up the Copper river valley to the Bonanza mine. The road was intended as the beginning of an extended plan of development which would open up the best coal and metal-mining fields of Alaska. It was also expected to develop agricultural possibilities, which are of greater extent than is commonly realized. Great hopes were based on the economies resulting from closely associated copper mines, smelteries and coal. Plans were under way to develop an enormous industry which would supply the entire Pacific seaboard with Alaska's anthracite and high-grade bituminous coal, and permit the economic smelting of iron ores along the Pacific coast from Alaska south to Lower California.

Then from a clear sky there fell the thunderbolt of government interference. Regardless of locations already made; regardless, too, of the expenditure of over \$1,500,000 by bona-fide prospectors (exclusive of such sums as are at all alleged to bear any evidence of taint), Alaska's coal deposits which it was planned to develop were totally withdrawn from entry.

The plans of empire building in Alaska have been brought to a halt, let us hope but temporarily. It appears pretty certain that the investment of \$15,000,000 in the present railway would never have been made could present conditions of government interference have been foreseen. Contracts were already in force, however, and could not be abrogated. Further investments to meet with the original plans, are now out of the question.

The misdirected ardor of uninformed government employees, and the vacillating attitude of boneheaded and backboneless politicians catering at Washington to the approval of the voting masses, are to blame for present conditions.

Alfred H. Brooks, in charge of the Alaska division of the United States Geological Survey, asserts that "it is a mistaken policy that would compel the 30,000,000 people of the west to continue to pay toll to the railroads and steamship companies for hauling their coal, coke, iron and steel from the east. Alaska's coal should be made available for the use of the manufacturers of the Pacific coast." A better informed and more able authority on Alaska than Doctor Brooks, it would be impossible to find. A couple of weeks ago the Mondell royalty bill on Alaska's coal, a bill which would have offered some, at least, temporary relief, was defeated in Congress.—*The Mining World*.

Railway Proposals in Canada.

In the Canadian House of Commons last week, Hon. G. P. Graham presented the annual railway budget statement, announcing definitely that a vote will be included in the supplementary estimates for a start on the Hudson railway. The government proposes to establish terminal facilities at either Nelson or Churchill, and to arrange for a steamship service to Europe. Mr. Graham grew enthusiastic over the possibilities of the road, declaring that it would be an ideal route for the western cattle trade. He estimated the cost roughly at \$30,000,000. Referring to the arguments for the construction of the Georgian bay canal Mr. Graham declared that the fears of diverting traffic through the enlarged Welland by way of Oswego and New York were groundless. Even with the deepened Erie canal, the average draught would only be 12 ft., and it would take a vessel seven days to reach New York, owing to the frequent locking. Compared with the Lake Erie and St. Lawrence route to Mont-

real, the Oswego route had many drawbacks, and Mr. Graham advocated bringing the terminal facilities at Montreal to such a high state of equipment that that gateway should be more than ever in a position, not only to compete successfully with New York, but to take away trade from that port.

Mr. Graham reminded his hearers that transportation had as much to do with the prosperity of a country as tariffs. Unless good facilities were provided for getting products to markets, the good effect of tariff legislation was nullified. It was the policy of the government not to give any further land grants to railways. Land was too valuable, and it was more practical to give aid in money. He had no fears as to the future prosperity of the Canadian railways.

Mr. Graham paid a tribute to the work of the railway commission, which he declared was doing better work than any similar tribunal in the world. An operating department had recently been added to the board. There had been suggestions that a counsel for the public should be appointed, but by the democratic system under which the commission was operated every man with a grievance which he desired to have redressed had merely to communicate with it, and if he had grounds for his complaint prompt justice would be meted out.

Speaking of the improvements being made by the great railways, Mr. Graham said that the Canadian Pacific improvements now under construction at the two cities of Calgary and Toronto alone will involve an expenditure of \$17,000,000. At Calgary a million dollars will be devoted to the building of a huge hotel. The railway station, new only two years ago, is to be greatly enlarged. At Toronto new stations, new freight sheds and a huge sixteen story building are to be erected.

Railway Signal Association.

The programme for the March meeting of this association, which is to be held at the Congress hotel, Chicago, next Monday, beginning at 10 a. m., provides for the submission of committee reports at the forenoon session. At the afternoon session there will be presented two papers, one by A. H. McKeen on Portable Storage Batteries as Used on the Harriman Lines, and one by L. F. Howard on Alternating Current Signaling.

The report of Committee No. 1 is devoted wholly to symbols to be used in signal drawings, and the committee presents a revised code of such symbols, filling 12 pages of the journal.

Committee No. 10 submits for discussion some proposed paragraphs for specifications of materials.

Secretary C. C. Rosenberg reports that all of the subjects which were referred to letter ballot at the annual meeting of the convention, which was held at Richmond last October, have been acted on affirmatively, with the exception of drawings 1045 A and 1046 A, showing signal aspects. These drawings received a majority of favorable votes but not the necessary two-thirds. Most of the votes showed a very large affirmative majority, but the semaphore lamp and specifications, and the lamp equipment, were adopted with very few votes to spare. The conclusions of the committee in regard to desirable characteristics of automatic stops and cab signals were adopted by a vote of 354 to 118.

St. Louis & San Francisco's New Cold Storage Process.

In an address before farmers of the Rio Grande valley at San Benito, Texas, B. F. Yoakum, chairman of the board of the St. Louis & San Francisco, announced the adoption by that road of a new cold storage process called the intermittent vacuum precooling process.

This cooling device, used successfully by the Southern Pacific, will make it possible for the 'Frisco to deliver vegetables from the Texan coast country to cities of the far north in good condition.

Mr. Yoakum said, in part: "There are north of Fort Worth and Dallas in St. Louis, Kansas City, Chicago, the Twin Cities and Denver more than 5,000,000 people, who will take vegetables from the farms of the Gulf coast country of Texas. We will furnish transportation if the farmer will furnish the products.

"Besides encouraging the growth of products which are profitable to the grower and in order to carry vegetables from Texas to northern points, we are going to construct a cold storage plant, which we believe has passed the experimental stage."

Congress of Technology.

A Congress of Technology will be held in Boston, April 10 and 11, in celebration of the fiftieth anniversary of the granting of the charter of the Massachusetts Institute of Technology, Boston. The fifty or more papers which will be presented at the congress will be written by graduates of the institute, and will thus serve to record the part the alumni of the institution have taken in the development of scientific industry. The papers will cover a wide range of subjects, including Mechanical Handling of Materials and the Necessity of Improvement in Present Methods at Rail and Steamship Terminals, by Richard Devens, M. I. T. '88, of the Brown Hoisting Machinery Company, Cleveland, Ohio; Mail Handling Machinery at the Pennsylvania Terminal and the New United States Post Office in New York, by J. E. Woodwell, M. I. T., '96, consulting engineer; The Scientific Thought as Applied to Railroad Problems in Contrast to the Methods of the Practical Railroad Man, by B. S. Hinckley, M. I. T., '99, engineer of tests for the New York, New Haven & Hartford.

Association of Railway Electrical Engineers.

The semi-annual convention of the Association of Railway Electrical Engineers will be held in the Washington Terminal station, Washington, D. C., June 16-17. The annual convention will be held at the La Salle Hotel, Chicago, November 6-10. The entire nineteenth floor of the hotel will be reserved for the meeting and the exhibits of the members of the Railway Electrical Supply Manufacturers' Association. The convention will open with a reception on the evening of November 6.

Traffic Club of Pittsburgh.

The ninth annual dinner of the Traffic Club of Pittsburgh will be held on March 30 at the Fort Pitt hotel. The honor guests will be George F. Baer, president of the Philadelphia & Reading; J. T. McCleary, secretary of the American Iron & Steel Institute, New York; Frank S. Black, former governor of New York. Willis L. King, vice-president of the Jones & Laughlin Steel Company, Pittsburgh, Pa., will be toastmaster.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held on March 15, a paper entitled Dams on Sand Foundations: Some Principles Involved in Their Design, and the Law Governing the Depth of Penetration Required for Sheet-Piling, by Alfred C. Koenig, Assoc. M. Am. Soc. C. E., were presented for discussion.

Canadian Society of Civil Engineers.

At the meeting of the Canadian Society of Civil Engineers, held on March 16, a paper on The Upper St. Lawrence River—its International History, Development of Navigation, and Future Possibilities was read by Henry Holgate.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual convention, May 23-26, Chicago.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; next meeting, June 22, 1911, Niagara Falls, N. Y.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.
- AMERICAN ASSOCIATION OF LOCAL FREIGHT AGENTS.—R. O. Wells, East St. Louis, Mo.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; May 17, New York.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
- AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION.—E. H. Fritch, Monadnock building, Chicago; March 21-23, 1911, Chicago.
- AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; May 9, 1911, Detroit, Mich.

Traffic News.

The United States district attorney at Chicago has brought two suits against the Rock Island and ten against the Indiana Harbor Belt charging violation of the 28-hour law governing shipments of live stock.

The Santa Fe has distributed among its employees buttons, which are to be worn on the lapel of the coat, bearing the words "Get the Safety Habit." "A mental tickler," is the way it is described by J. D. M. Hamilton, claims attorney of the road, at whose suggestion the buttons were got up.

Attorneys for the Burlington have notified Attorney-General Major of Missouri that on March 20 they will file in the United States Supreme Court a motion for a re-opening and re-argument of the Missouri maximum freight rate and the two-cent passenger rate cases, which were argued before the supreme court about five months ago and taken under consideration by it.

The Texas legislature has passed a bill to authorize the exchange of newspaper advertising for intrastate railway transportation. It is understood that Governor Colquitt favored permitting an exchange of advertising and transportation, but the bill as finally passed permits the issuance of free transportation to so many classes of state and federal officers that he may veto it.

The eastern lines have decided to make summer tourist rates from Chicago and St. Louis to Atlantic coast points slightly higher than last year. The round trip rate from Chicago to the Atlantic coast on the differential lines last year was \$25.50 and on the standard lines \$28.20. This year the rate on the differential lines will be \$26 and on the standard lines \$30. From St. Louis the rates will be, respectively, \$32 and \$35.

Suit has been begun in the Federal Court at Buffalo against the Pennsylvania railroad, for granting illegal rebates to the Standard Oil Company in 1905. It is said that the shipments on which this suit is based are the same on which was based the long pending criminal suits against the New York Central and the Standard Oil Company, which were recently decided in favor of the government. The oil was transported from Olean, N. Y., to points in Vermont.

The railways entering Chicago have decided to apply the schedule of switching rates for the Chicago district, which was published in the *Railway Age Gazette* of November 18, 1910, page 979. These rates are intended as a substitute for the rates fixed by the Illinois railway commission in its so-called "rule 23," and it was understood that their application would settle the question of switching rates in Chicago. The prospects now are that the question of the validity of the commission's rule 23 will be litigated to a conclusion in the federal courts. Seven of the roads have objected to the rates adopted by the railways.

The Secretary of War, exercising his authority over the operation of the Panama railroad, has notified the steamship companies that on freight from San Francisco to New York, the railway company, for its share of the haul from Panama across the isthmus by rail and thence by steamer to New York, will demand 40 per cent. of the through rate; 18 per cent. to go to the railway and 22 per cent. to the Atlantic steamship. Secretary Dickinson proposes to adopt a freight classification in place of the present rate of \$8 a ton, applicable to all commodities. It is further decided that through rates will not be made with steamships on the Atlantic side other than those belonging to the Panama road, except on shipments to places other than New York and Philadelphia.

The secretary of agriculture announces that 11,000 square miles of additional territory has been released from quarantine for Texas fever of cattle. This action is taken as a result of good progress made during the past year in the extermination of cattle ticks which spread the disease. The total area released from quarantine since the eradication of the ticks was systematically undertaken in the summer of 1906 by co-operation between federal, state and local authorities now amounts to nearly 140,000 square miles, and includes territory in the states of Virginia, North Carolina, South Carolina, Tennessee, Kentucky, Georgia, Mississippi, Arkansas, Oklahoma, Texas and California. The territory released by the recent order is in

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago; June 14-16, 1911, Atlantic City, N. J.
 AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.
 AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
 AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wednesdays, except June and August, New York.
 AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
 AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York; next convention, May 30-June 2, Pittsburgh, Pa.
 ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; April 26, 1911, New Orleans, La.
 ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; May, 1911, Montreal, Can.
 ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; semi-annual, June 16-17, Washington, D. C.; annual, November 6-10, Chicago.
 ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; June 19, 1911, Boston, Mass.
 ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, New York; June 20-21, 1911, Cape May City, N. J.
 CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.
 CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
 CAR FOREMAN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month; annual, October 9, Chicago.
 CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo, N. Y.
 CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
 ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
 ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
 FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; June 21, St. Paul, Minn.
 GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—H. D. Judson, 209 East Adams St., Chicago; Wednesday preceding 3d Thursday, Chicago; annual, July 29, Chicago.
 INDIANAPOLIS RAILWAY AND MECHANICAL CLUB.—B. S. Downey, C., H. & D., Indianapolis, Ind.
 INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; next convention, Omaha, Neb.
 INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
 INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago; May 15-18, 1911, Chattanooga, Tenn.
 INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; next convention July 25-27, Chicago.
 INTERNATIONAL RAILWAY MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.
 IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
 MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago; June 19-21, 1911, Atlantic City, N. J.
 MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.
 NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
 NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
 NORTHERN RAILWAY CLUB.—C. L. Kennedy, C. M. & St. P.; 4th Saturday, Richmond, Va.; 20th annual, June 21, 1911, St. Paul, Minn.
 OMAHA RAILWAY CLUB.—A. H. Christiansen, Barker Bldg.; second Wed. Railway Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
 RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
 RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; March 20, Chicago; annual, Oct. 10, Colorado Springs, Colo.
 RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio; annual, May 22-24, 1911, Milwaukee, Wis.
 RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
 ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Oct., 1911, St. Louis.
 ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis; annual, Oct. 20, Atlanta.
 SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.
 SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; semi-annual, April 20, Atlanta, Ga.
 SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Prudential bldg., Atlanta, Ga.; 3d Thurs., Jan., April, August and Nov., Atlanta.
 TOLEDO TRANSPORTATION CLUB.—L. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday; annual, May 6, 1911, Toledo.
 TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
 TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
 TRAFFIC CLUB OF PITTSBURGH.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
 TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 20, 1911, Baltimore, Md.
 TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; 1st Sat. after 1st Wed.; annual, Dec. 11, 1911.
 TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August, 1911, Chicago.
 WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August; annual, May 8, Winnipeg.
 WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
 WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.
 WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, First National Bank bldg., Chicago.

Virginia North Carolina, Tennessee, Mississippi, Oklahoma and Texas.

Commissioner Clark of the Interstate Commerce Commission and counsel for the railways and shippers have reached an agreement as to a basis for settlement of a large number of claims presented by shippers growing out of the decision of the Interstate Commerce Commission in the Denver rate case. The commission's order reducing the rates from Atlantic seaboard territory to Denver would have become effective on July 1, 1909, but because they were suspended by an injunction of the federal circuit court which finally was dissolved by the Supreme Court, the reduced rates were not actually made effective until October 26, 1910. The stipulation entered into is that the date of the delivery of goods to the shipper at Denver shall determine the question of the validity of the claim, and that on all shipments which, as shown by the expense bill, reached Denver after July 1, 1909, and prior to October 26, 1910, reparation will be made. Ordinarily the rate in effect at the time a shipment begins to move is controlling, and the decision to make reparation with reference to the date on which shipments were received was agreed to save the trouble and expense of tracing back to find the date of origin of the various shipments.

Car Surpluses and Shortages.

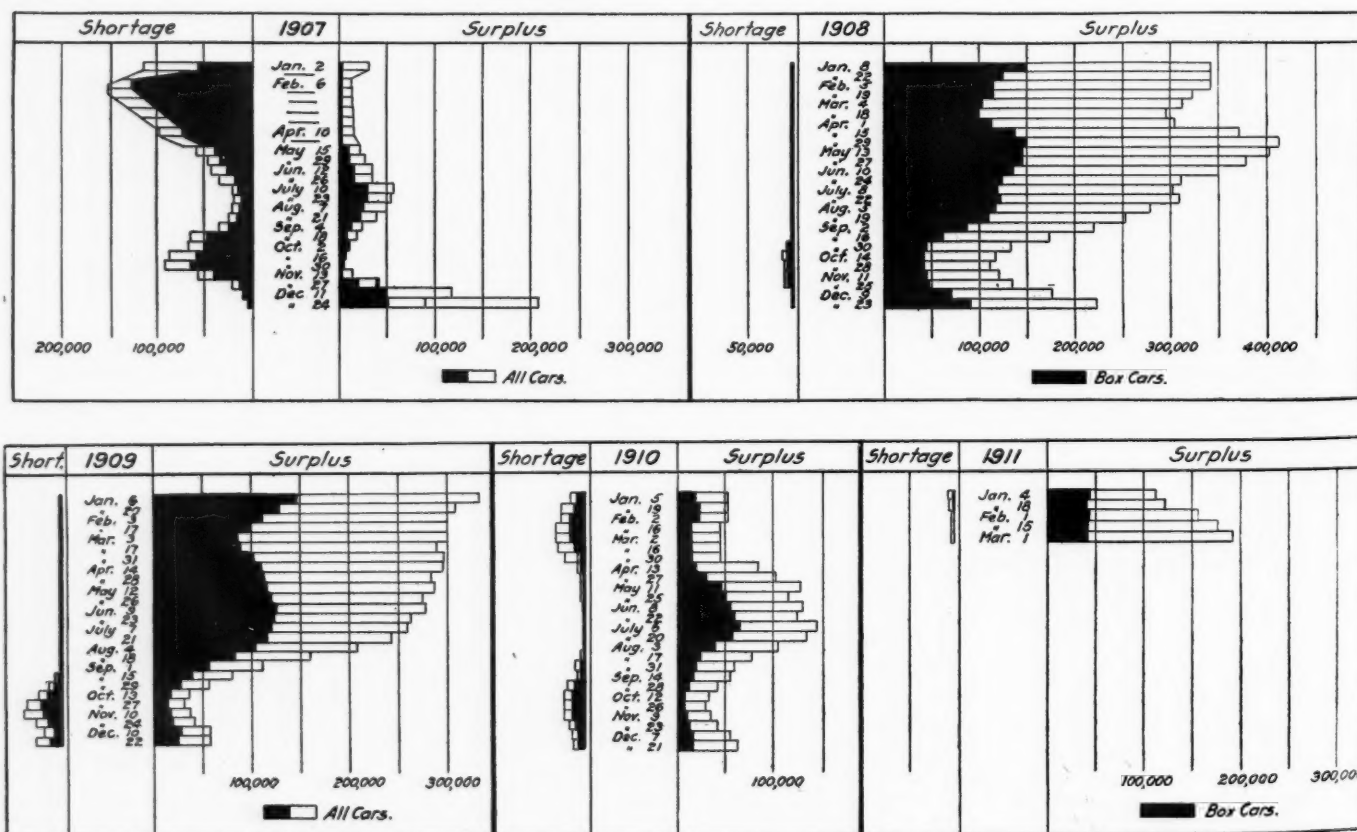
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in the committee presenting statistical bulletin No. 91, giving a summary of car shortages and surpluses by groups from November 10, 1909, to March 1, 1911, says:

"This report shows a further increase in the surplus of 17,064 cars, making a total of 192,673. This increase is practically all in groups 2 (Eastern), and 3 (Middle), and is made up almost entirely of coal and gondola cars. While the situation so far this year is unprecedented, as regards increases in the surplus during the first three months of the year, it will be noted that the box car surplus has remained stationary since the first of the year, with a slight reduction in this bulletin. This seems to bear out the theory that the difference between the surplus this year and last year is due largely to milder weather conditions existing during the present winter, coupled with the increase in available equipment, which amounts to practically 100,000 cars as compared with a year ago."

The accompanying table gives surpluses and shortages by groups for the last period covered by the report and the charts show total biweekly figures for 1907 to 1911 inclusive.

Date.	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—March 1, 1911.....	8	79	1,300	3,033	246	4,658	220	50	0	21	291
" 2.—" 1, 1911.....	24	2,038	387	21,845	10,222	34,492	0	0	0	24	24
" 3.—" 1, 1911.....	27	5,963	2,371	51,524	4,431	64,289	125	0	0	301	426
" 4.—" 1, 1911.....	10	2,699	141	7,172	1,808	11,820	39	201	0	0	240
" 5.—" 1, 1911.....	18	2,686	687	5,397	1,233	10,003	33	0	56	4	93
" 6.—" 1, 1911.....	22	8,860	1,242	5,037	5,726	20,865	60	8	30	107	205
" 7.—" 1, 1911.....	4	999	114	1,592	1,243	3,948	0	0	0	3	3
" 8.—" 1, 1911.....	15	6,804	728	4,850	2,843	15,225	0	0	0	0	0
" 9.—" 1, 1911.....	11	3,279	370	310	750	4,709	0	0	0	0	0
" 10.—" 1, 1911.....	19	5,425	2,747	2,955	10,016	21,143	0	2	0	4	6
" 11.—" 1, 1911.....	5	49	771	27	673	1,529	1,227	0	0	316	1,543
Total	163	38,881	10,858	103,742	39,191	192,673	1,704	261	86	780	2,831

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia, and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues				Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	Total.	Inc. misc. structures, equipment.	Way and maintenance.	Traffic.	Trans- portation.	General.	Total.				
Atchison, Topeka & Santa Fe.....	7,526 ^a	\$4,596,506	\$1,913,940	\$6,510,446	\$1,009,122	\$1,228,019	\$153,430	\$3,326,700	\$155,937	\$4,873,208	\$2,161,877	\$61,048	\$1,900,829	\$623,011
Atlantic Coast Line.....	4,495	1,749,108	722,381	2,471,489	348,441	348,441	39,151	923,574	69,800	1,792,857	967,434	95,500	812,129	31,470
Baltimore & Ohio.....	4,434	4,897,543	1,073,395	5,970,938	304,447	4,157,534	151,317	2,948,250	156,677	5,276,035	1,137,280	201,145	871,460	384,775
Boston & Maine.....	2,243	2,035,358	1,050,964	3,086,322	313,726	484,989	34,288	1,753,460	86,897	2,684,771	685,795	186,313	497,811	69,858
Central of New Jersey.....	631	1,578,325	324,476	1,902,801	163,875	305,184	31,667	606,268	42,824	1,149,838	860,165	78,886	766,078	87,273
Chesapeake & Ohio.....	1,940	2,230,664	371,956	2,602,620	244,775	528,320	46,840	862,656	60,642	1,742,873	967,434	53,623	868,393	90,744
Chicago, Milwaukee & Puget Sound.....	1,973 [†]	871,828	84,643	956,471	117,053	146,290	28,436	479,450	18,680	789,909	201,162	50,307	146,669	181,023
Chicago, Milwaukee & St. Paul.....	7,511	3,222,355	986,820	4,209,175	348,667	3,860,508	84,063	2,629,212	98,128	4,183,265	553,359	226,616	372,822	72,119
Chicago, Rock Island & Pacific.....	7,548 [†]	3,273,686	1,481,341	4,755,027	609,525	752,462	160,272	2,221,162	136,652	3,880,072	1,191,542	206,883	974,133	321,578
Cleveland, Cincinnati, Chic. & St. Louis.....	1,979	1,554,313	580,929	2,135,242	73,121	418,886	63,685	1,140,912	60,550	1,979,154	365,727	80,000	277,862	244,167
Delaware & Hudson R. R. Dept.....	819 [‡]	1,350,690	174,725	1,525,415	246,271	73,334	18,046	672,621	45,606	1,056,478	516,133	38,758	475,671	82,786
Delaware, Lackawanna & Western.....	930	2,145,936	537,820	2,683,756	187,722	433,045	52,399	943,366	62,828	1,685,510	1,192,001	138,028	1,065,516	148,970
Denver & Rio Grande.....	2,542	1,301,139	300,788	1,601,927	149,695	337,983	38,338	675,221	53,741	1,274,970	407,414	7,056	327,358	95,433
Erie.....	1,994 [†]	2,747,301	613,775	3,361,076	311,892	686,689	92,155	1,404,271	82,629	2,577,636	1,068,633	120,631	894,030	86,392
Great Northern.....	7,274 [†]	2,147,568	791,070	2,938,638	509,329	635,912	79,739	1,451,496	99,199	2,775,675	510,140	249,739	259,175	490,211
Illinois Central.....	4,574 [†]	3,659,299	1,049,275	4,708,574	446,267	974,804	113,841	1,990,607	112,020	3,637,539	1,712,071	242,231	1,477,141	339,067
Lake Shore & Michigan Southern.....	1,663	2,408,402	840,091	3,248,493	483,693	612,067	81,511	1,549,513	74,686	2,801,479	915,036	135,000	774,525	400,531
Lehigh Valley.....	1,433	2,514,725	279,952	2,794,677	252,473	495,411	72,853	1,063,772	66,610	1,951,119	955,611	101,500	810,262	60,110
Louisville & Nashville.....	4,591	3,286,132	948,929	4,235,061	710,773	819,955	112,311	1,541,783	91,247	3,276,069	1,232,390	150,000	1,073,870	160,805
Michigan Central.....	1,803 ^c	1,618,385	500,738	2,119,123	310,948	367,224	72,240	1,149,340	45,360	1,945,112	419,807	110,000	306,875	126,805
Missouri Pacific.....	3,204 [†]	1,229,330	342,108	1,571,438	291,641	271,336	56,948	1,013,092	67,183	1,700,200	86,189	83,500	316	214,458
New York Central & Hudson River.....	3,591	4,712,782	1,287,044	6,000,826	1,054,789	596,511	179,143	3,469,659	202,152	6,448,320	1,259,736	383,390	924,283	439,518
New York, New Haven & Hartford.....	2,041	2,390,626	1,954,683	4,345,309	505,953	596,511	24,131	2,090,686	170,893	3,388,174	1,389,545	275,000	1,225,456	119,822
Norfolk & Western.....	1,990 [†]	2,511,732	317,531	2,829,263	306,535	604,700	48,984	926,972	64,813	1,952,004	979,033	115,000	863,493	132,401
Northern Pacific.....	6,028 ^c	2,837,450	1,114,371	3,951,821	383,059	647,690	84,420	1,815,016	106,074	3,036,259	1,218,657	212,746	1,017,375	326,169
Pennsylvania Co.....	1,416	2,356,669	660,051	3,016,720	417,850	707,265	88,605	1,528,797	84,888	2,838,098	579,752	179,405	395,949	520,308
Pennsylvania R. R. Co.....	3,977 [†]	8,927,221	2,498,948	11,426,169	1,692,728	2,600,594	169,414	5,162,653	337,024	9,332,516	2,427,315	531,228	1,713,665	1,091,838
Philadelphia, Baltimore & Washington.....	713	660,669	602,330	1,262,999	241,025	259,024	24,975	678,943	34,033	1,237,900	203,452	47,396	156,056	46,733
Pittsburgh, Cincinnati, Chic. & St. Louis.....	1,467	2,080,460	627,221	2,707,681	303,587	608,928	81,451	1,324,288	64,995	2,385,249	727,465	135,290	971,318	243,882
St. Louis & San Francisco.....	4,732	2,208,019	936,167	3,144,186	341,289	486,730	88,268	1,325,946	105,170	2,296,743	1,116,096	144,772	971,324	157,885
St. Louis, Iron Mountain & Southern.....	3,316 [†]	1,755,740	553,804	2,309,544	309,671	269,427	55,023	815,682	75,197	1,525,000	987,396	78,916	903,767	310,575
Seaboard Air Line.....	3,046 [†]	1,220,538	408,890	1,629,428	235,838	255,052	66,896	867,237	48,469	1,236,492	574,658	70,000	505,500	23,187
Southern.....	7,038	3,234,111	1,271,267	4,505,378	604,401	811,652	125,864	1,602,718	163,758	3,508,393	1,361,047	190,748	1,171,236	82,189
Union Pacific.....	3,473 [†]	2,699,695	3,623,577	6,323,272	282,193	527,004	113,872	1,160,356	101,514	2,184,939	527,004	150,650	1,274,906	246,547
Wabash.....	2,514	1,663,439	516,788	2,180,227	218,613	408,196	77,921	1,090,651	96,033	1,891,414	476,081	76,948	395,519	163,543
Yazoo & Mississippi Valley.....	1,372	722,406	268,489	990,895	141,382	114,821	14,977	335,805	24,310	631,295	418,017	36,053	381,520	168,171
Atchison, Topeka & Santa Fe.....	7,526 ^a	\$35,129,923	\$13,435,360	\$48,565,283	\$7,621,399	\$8,049,374	\$1,021,785	\$15,250,184	\$1,085,408	\$33,028,150	\$19,621,705	\$1,677,867	\$17,943,838	\$1,852,711
Atlantic Coast Line.....	4,495	11,975,595	3,378,460	15,354,055	2,356,938	2,799,462	317,775	5,809,664	481,089	11,704,031	5,919,439	663,000	5,256,439	92,418
Baltimore & Ohio.....	4,434	40,687,919	9,539,210	50,227,129	6,436,275	10,030,965	1,207,805	20,140,103	1,093,825	38,906,975	14,502,437	1,520,010	12,903,319	2,024,726
Boston & Maine.....	2,243	15,155,889	7,926,164	23,082,053	3,532,173	3,423,199	303,661	12,291,441	633,415	20,183,889	6,716,459	1,251,567	5,491,699	1,270,059
Central of New Jersey.....	631	10,721,742	2,867,132	13,588,874	1,507,632	2,195,445	223,225	4,149,561	223,225	6,352,225	5,940,841	663,543	3,886,331	270,764
Chesapeake & Ohio.....	1,940	14,805,884	3,262,998	18,078,882	2,141,539	3,490,324	315,503	5,547,307	418,608	11,913,281	6,928,955	554,123	6,359,399	619,651
Chicago, Milwaukee & Puget Sound.....	1,973 [†]	7,436,340	850,452	8,286,792	488,420	881,064	201,777	2,996,160	91,200	4,658,621	3,845,951	277,307	3,582,160	—
Chicago, Milwaukee & St. Paul.....	7,511	27,829,759	8,832,834	36,662,593	40,259,013	5,969,920	739,153	17,274,233	625,397	29,685,474	10,574,636	1,529,618	9,167,941	1,224,504
Chicago, Rock Island & Pacific.....	7,548 [†]	25,293,281	12,021,458	37,314,739	5,449,242	5,284,130	1,101,622	14,847,529	968,795	27,949,962	11,644,639	1,567,202	10,004,132	380,259
Cleveland, Cincinnati, Chic. & St. Louis.....	1,979	12,015,239	4,936,068	16,951,307	2,478,252	3,189,572	612,256	7,831,032	402,689	14,513,801	4,072,817	573,548	3,444,990	1,488,529
Delaware & Hudson R. R. Dept.....	819 [‡]	10,036,117	1,916,914	11,953,031	944,534	1,683,928	160,240	4,219,305	284,390	7,292,397	5,042,279	323,638	4,720,430	140,546
Delaware, Lackawanna & Western.....	930	15,483,116	4,607,645	20,089,761	2,424,127	2,979,462	414,780	6,351,933	408,211	12,578,513	8,833,817	945,053	8,026,377	1,505,416
Denver & Rio Grande.....	2,542	10,763,622	2,865,631	13,629,253	1,741,439	2,467,334	335,754	4,945,225	344,697	9,835,449	4,828,654	493,000	4,321,196	265,670
Erie.....	1,994 [†]	21,244,749	5,608,673	26,853,422	3,444,807	4,839,384	699,346	9,408,450	558,115	18,950,102	9,979,663	810,203	9,034,035	328,844
Great Northern.....	7,274 [†]	27,187,498	8,264,015	35,451,513	5,226,775	4,543,892	590,901	10,821,490	674,698	21,857,756	16,251,656	1,417,331	14,449,388	1,058,788
Illinois Central.....	4,574 [†]	24,564,435	7,888,738	32,453,173	4,549,370	7,361,232	788,475	12,385,354	737,840	25,822,274	10,921,756	26,232	9,406,702	2,397,348
Lake Shore & Michigan Southern.....	1,663	19,008,581	7,044,683	26,053,264	4,915,173	4,584,413	475,521	10,347,864	549,521	21,122,002	8,301,587	1,045,182	7,222,608	3,185,095
Lehigh Valley.....	1,433	18,041,679	2,817,311	20,858,990	2,214,063	3,623,942	584,805	7,030,739	455,717	13,909,266	7,711,500	661,700	6,859,218	736,535
Louisville & Nashville.....	4,591	23,529,084	7,003,270	30,532,354	5,232,502	5,601,614	675,252	10,336,375	631,308	22,477,051	9,576,258	7,642	9,007,100	1,835,864
Michigan Central.....	1,803 ^c	11,481,397	4,736,426	16,217,823	2,667,249	2,583,462	541,030	7,405,803	341,012	13,538,556	4,933,775	805,020	3,701,997	1,394,430
Missouri Pacific.....	3,204 [†]	10,607,816	2,911,603	13,519,419	1,505,075	2,393,226	148,085	6,756,143	488,525	12,400,316	2,656,729	584,500	2,055,496	—
New York Central & Hudson River.....	3,591	34,626,878	11,755,261	46,382,139	8,495,220	10,225,272	1,473,854	22,638,170	1,555,290	44,357,864	15,791,778	2,784,886	13,072,337	2,670,870
New York, New Haven & Hartford.....	2,041	17,888,437	3,578,929	21,467,366	2,466,308	4,190,555	201,797	14,335,470	1,037,711	24,031,953	7,110,988	2,187,000	11,780,971	2,644,170

Iowa Railway Commissioner Favors Abolition of Iowa Long and Short Haul Law.

At a time when the question of the application of the long and short haul clause of the Interstate Commerce act is pending, it is of interest and significance that N. S. Ketchum, one of the members of the Iowa railway commission, has expressed himself in favor of the repeal of the long and short haul clause of the Iowa law. Iowa is the only state in which the long and short haul rule has been steadfastly and consistently insisted on. The Iowa law prohibits a railway from reducing its rates between two points, where it is a long line in order to meet short line competition, unless it shall make proportionate reductions between other points on its lines. Mr. Ketchum's statement is as follows:

"I favor the abolition of the long and short haul clause of the Iowa freight tariff. I would not restore to the railways the power to make these rates. I would leave that power to the discretion of the railway commission. The present tariff absolutely throttles competition. Marshalltown and Des Moines are on the North Western and Short Line railways. A man wishing to ship goods from Des Moines to Marshalltown naturally uses the Short Line because it is a shorter distance and the North Western, under the laws of the state, if the North Western made a rate as low as the Short Line rate, then it would be compelled to establish a low rate for the same distance in every part of Iowa. That would be manifestly unfair, for in some parts of the state the rate might be confiscatory.

"Again the North Western was the first road between Carroll and Council Bluffs. Many factories and mills were built along the line of this road. In later years the Great Western has cut across the North Western and formed a short line between Carroll and Council Bluffs. Yet the North Western cannot put in operation the short-haul rates to meet the Great Western competition because if it puts them in there it must establish them over its entire system. With many factories and mills on the North Western the owners pay a higher rate than they really should.

"Now, my plan would be this: Abolish the long and short haul clause, leaving the rates the same, and then let the railway commission use its discretion in applying these rates. If this was the situation we would tell the North Western to put in the short-haul rates between Marshalltown and Des Moines which are used by the Short Line, and at the same time we could let the road use the long-haul rates for the same long distances in other places. Giving the commission this power would restore the competition between Marshalltown and Des Moines."

INTERSTATE COMMERCE COMMISSION.

Reparation Awarded.

Carstens Packing Co. v. Southern Pacific et al. Opinion by the commission:

Charges assessed for transportation of eight carloads of live stock from Klamath Falls, Ore., to Portland, Ore., via Weed, Cal., not found to be unreasonable. (20 I. C. C. 165.)

W. F. Maxwell v. Wichita Falls & Northwestern et al. Opinion by the Commission:

Rates of 6½ cents per 100 lbs. on house blocking, Burkburnett, Tex., to Devol, Okla., and 11 cents per 100 lbs. on fence posts, Devol, Okla., to Olney, Tex., found unreasonable in so far as they exceeded, respectively, 3½ cents and 7 cents. (20 I. C. C., 197.)

C. B. Havens & Co. v. Chicago & North Western. Opinion by the commission:

On a shipment of anthracite coal from Chicago to Sturgis, S. Dak., for government use, the complainant is not entitled to the benefit of a land-grant rate not published when the traffic moved, although subsequently made applicable to similar traffic for a time by lawful publication. (20 I. C. C. 156.)

Pacific Coast Biscuit Co. v. Oregon Railroad & Navigation et al. Opinion by the commission:

A transcontinental tariff provided one rate on wax or gummed paper and a lower rate on wrapping paper. The paper shipped by complainant was slightly waxed with paraffin, and although

sometimes used as an outside wrapper, it was what is known to the trade as wax paper. Having established a specific rate on wax paper, defendants were compelled to apply that rate to all grades and qualities of wax paper, regardless of the use to which it might be put. (20 I. C. C. 178.)

Rate on Sash Weights Reduced.

W. K. Henderson Iron Works & Supply Co. v. Texas & Pacific. Opinion by the commission:

Rate of 23 cents per 100 lbs. from Shreveport, La., to Marshall, Tex., found unreasonable, and a rate of 6½ cents per 100 lbs. established for the future. (20 I. C. C. 159.)

Rates on Vegetables from Charleston Reasonable.

Truck Growers Association of Charleston v. Atlantic Coast Line et al. Opinion by Commissioner Harlan:

Rates on potatoes, cabbages, and vegetables, n. o. s., from Charleston, S. C., to New York, Boston, Philadelphia, Baltimore, and other northern markets found not to be unreasonable in themselves or when compared with the water-compelled rates on the same commodities from Norfolk and producing points in that district. Rates from the same points of origin to the same destinations found not to be out of line with the current rates on the same commodities from Florida points; the control of these markets enjoyed by Florida growers shown to be due not to rates but to climatic and other conditions. (20 I. C. C., 190.)

STATE COMMISSIONS.

The Minnesota Railway Commission has postponed its investigation into the reasonableness of express rates in that state at St. Paul from March 29 to April 5.

The State Railroad Commission of Pennsylvania has caused action to be taken in the court of Dauphin county, to compel compliance by the Baltimore & Ohio with an order of the commission, directing the reduction of passenger rates.

The Louisiana railway commission has issued a notice stating that in its investigation into the reasonableness of express rates and charges it will consider all phases of the question, including the establishment of a new graduate scale of charges to apply on packages weighing less than 100 lbs., should the investigation prove that the present graduate charges are excessive or unreasonable. Hearings will be held on the general question of express rates and service at Monroe on March 27, Shreveport on March 28, Alexandria on March 29, and at New Orleans on March 30.

COURT NEWS.

The federal court at Sioux Falls, S. D., on March 10 issued a restraining order prohibiting the South Dakota railway commission from making a general reduction in rates in the state west of the Missouri river. The case is set down for hearing on April 13.

Judge Ross of the federal circuit court at Los Angeles, Cal., on March 13, threw out of court the suit brought by George E. Roberts and others to dispossess the Southern Pacific of a large amount of oil lands in the Midway and Maricopa fields in Kern county. The ground on which the suit was brought was alleged false entry.

The Kansas supreme court on March 11 rendered a decision holding unconstitutional a state law requiring the railways to haul members of the State National Guard when on duty for one cent a mile. The law was originally passed in 1895. The railways did not contest its validity until after the state railway commission issued an order establishing the two-cent fare in that state. The court held that the law improperly discriminated between members of the National Guard and other persons.

The Federal Circuit Court for Nevada has rendered a decision holding that state rates have no bearing on interstate rates. The Nevada Railway Commission ordered reductions in intrastate

rates. The railways attacked them on the ground that their application would interfere with interstate commerce, and the court held that the only question to be considered was whether the state rates were reasonable, and that if the state commission made reasonable rates the order making them could not be held unconstitutional because the rates conflicted with rates fixed by the railways for interstate traffic.

The New Jersey Court of Errors and Appeals, in the case of *Larned vs. Central of New Jersey*, has affirmed a judgment for the plaintiff, holding that a railway checking baggage on a passenger's ticket assumes entire control of it, and thereby takes it primarily as a carrier. The fact that the passenger does not take the same train on which the baggage is carried does not modify or change the responsibility of the company. The court says: "The methods of carrying baggage have changed greatly of late years, even to the extent of running trains exclusively for baggage, and it is notorious in many cases, especially at certain seasons, the passenger has no assurance whatever that his baggage will go on the same train as that which he takes himself, even when checked in due season for that purpose."

The Galveston Terminal Case.

The decision of the Supreme Court of the United States, sustaining the order of the Interstate Commerce Commission forbidding discrimination by the Southern Pacific Terminal Company at Galveston, which was briefly noticed in our issue of February 24, gives interesting details of an unsuccessful attempt of the Southern Pacific to legally lease a part of its docks at Galveston to a factory. The deed and charter under which the docks are owned and operated contain strong provisions dedicating the lands to public transportation uses.

The decision is by Mr. Justice McKenna. One of the three piers owned by the company was leased to E. H. Young for \$15,000 a year; and, buildings having been put up for him, he used the premises for grinding cotton seed meal, the cotton seed being received by rail from points in Texas and other states, and the meal being shipped by sea to foreign countries. Wharfage being charged on shipments of all other parties, while Mr. Young paid no wharfage (except his rent), he rapidly took the cotton seed meal business away from his competitors, being able to undersell them to the extent of 30 or 40 cents a ton. The other dealers complained.

The original deed for the property to C. P. Huntington stipulated that it should be used for terminal facilities for the Southern Pacific railway and steamship systems; and the city of Galveston, in surrendering the right to lay out streets on or near the property, made a similar stipulation. There was also a clause subjecting the wharfage charges to regulation by the State Railway Commission, and it was required that the railway tracks should connect with other railways and that the terminal company should not consolidate with the Galveston Wharf Company or any other rival.

The Southern Pacific tracks are the only tracks having connections with those of the terminal company, and the S. P. does all of the switching. The terminal company has no engines and issues no bills of lading. It publishes a wharfage tariff, which, however, is not filed with the Interstate Commerce Commission. The tariff, naming 20 cents a ton as a charge on cotton seed meal and cakes, does not show that any exception is made as to the dock occupied by Mr. Young. Piers A and B are sufficient for the business of the company; and pier C, for the use of Mr. Young, was built on land to the westward, lying idle and not needed. Mr. Young pays a yearly rent of \$15,000, and agrees to route all shipments over the terminal and its connections (that is to say, the Southern Pacific); but if rival lines should make lower rates, he must give the Southern Pacific a chance to meet such lower rates. Mr. Young's machines on the dock represent an investment of \$50,000.

The order of the Interstate Commerce Commission, requiring the railway to cease favoring Mr. Young, was to run for a term of two years, which would end November 15, 1910; but the court holds that this expiration of the order cannot hinder it from deciding the case. The issues involved are continuing issues and considerations affecting them are not to be defeated by short term orders. In the case of the Trans-Missouri Freight Association, there was an attempt to defeat the purpose of the suit

before the court by a voluntary dissolution of the agreement, but the court adjudicated the questions at issue, there having been no extinguishment of the rights of the public.

Four principal claims were made: (1) The commission had no jurisdiction over the terminal company, and (2) had no power to declare the lease illegal; (3) the lease is not an unlawful discrimination within the meaning of the act to regulate commerce; (4) the commission, by its order, assumed to control intrastate and foreign commerce not subject to the act to regulate commerce.

These claims are based largely on the assumption that the owners' title to the property was absolute, but this overlooks the conditions in the deed and in the city ordinance (and also in an act of the legislature). It was claimed that the terminal company was a purely wharfage company, having no power to act as a common carrier, but in point of fact it did construct tracks and terminal facilities, to accommodate the export and import traffic of Galveston. These are instrumentalities of traffic; wharfs are as essential as steamships and railways. Again, the property is controlled by the Southern Pacific Company through stock ownership. Verbal declarations cannot alter the facts; the control and operation by the Southern Pacific of the railways and the terminal company have united them into a system and the terminal company is a necessary part of the system. It was contended that stock ownership did not make a union, but the court says that the record "does not present a case of stock ownership merely, or of a holding company which was content to hold." In support of the contention that the traffic was not interstate and was not foreign commerce of the class covered by the Interstate Commerce Law, it was urged that the cake and meal were shipped to Galveston for delivery, and Galveston was the final destination of the shipments; but the court brushes this argument aside. Some of the meal and cake were bought at points north of Texas and directly exported. The shipments were in fact all destined for export and by their delivery to the Southern Pacific must be considered as having been delivered for transportation to their foreign destination.

Corporation Tax Law Sustained.

The Supreme Court of the United States has unanimously sustained the corporation tax law. The decision by Mr. Justice Day, was issued last Monday. The Court says:

The tax is imposed not upon the franchises of the corporation irrespective of their use in business, or upon the property of the corporation, but upon the doing of corporate or insurance business, and with respect to the carrying on thereof, in a sum equivalent to 1 per centum of the entire net income over and above \$5,000, received from all sources during the year. It is a tax upon the doing of business with the advantages which inhere in the peculiarities of corporate or joint stock organizations of the character described. The income is not limited to such as is received from property used in the business, strictly speaking, but is expressly declared to be upon the entire net income above \$5,000 from all sources, excluding the amounts received as dividends on stock in other corporations . . . also subject to the tax.

After Justice Day had given the interpretation which the court had put upon the provisions of the act he proceeded to answer objections. He first took up the contention that it was a direct tax and unconstitutional, for the same reason that the famous income tax law was declared unconstitutional in 1895. He pointed out that the income tax was held by the Court to be direct because imposed upon property simply because of its ownership. But in the present case the tax is not payable unless there is a carrying on or doing of business in the designated capacity. On the objection that a tax levied upon the exclusive right of a state to grant corporate franchises, the opinion says that such business activities, though exercised because of state-created franchises, are not beyond the taxing powers of the United States. If it be true that the forming of a state corporation would defeat this purpose, by taking the necessary steps required by the state law to create a corporation and carrying on business under rights granted by a state statute the federal tax would become invalid, and that source of national revenue be destroyed, except as to the business in the hands of individual or partnership. It cannot be supposed that it was intended that it should be within the power of individuals acting under state

authority to thus impair and limit the exertion of authority which may be essential to national existence.

Justice Day next addressed himself to the objection that the tax was unequal and arbitrary. He said there was a substantial difference between the carrying on of business between corporations taxed and the same business when conducted by a private firm or individual. The tax is laid upon the privileges which exist in conducting business with the advantages which inhere in the corporate capacity of those taxed, and which are not enjoyed by private firms or individuals. The continuity of the business, without interruption by death or dissolution, the transfer of property interests by the disposition of shares of stock, the advantages of business controlled and managed by corporate directors, the general absence of individual liability, these and other things inhere in the advantages of business thus conducted, which do not exist when the same business is conducted by private individuals or partnerships. It is this distinctive privilege which is the subject of taxation.

Measurement of the tax by the net income of the corporation is not so unequal and so arbitrary and baseless as to fall outside of the authority of the taxing power. The right to select the measure and objects of taxation devolves upon the Congress and not upon the courts, and such selections are valid unless constitutional limitations are overstepped.

The court held that it was no part of the essential governmental functions of a state to provide means of transportation, supply artificial light, water and the like. Therefore it was determined that the Coney Island & Brooklyn Railroad and the Interborough Rapid Transit Company of New York are subject to the tax.

As to the so-called publicity features of the act which require certain returns to be made to the government as an aid in the assessment of a tax, it is for Congress to determine what means are appropriate and adapted to the purposes of making the law effectual.

The opinion thus summarized covers fifteen of the eighteen cases in which the constitutionality of the tax was assailed. The non-applicability of the act to real estate trusts was decided in the other three cases. The Department Store Trust and the Cushing Real Estate Trust, both of Boston, were not organized under the statutes of the state or of the United States, but existed merely under the common law. The Minneapolis Syndicate was held not liable to the tax because the real estate which it held before a recent reorganization had gone out of its control, and therefore the syndicate was not "doing business" within the meaning of the law.

Fines for Rebating.

In the United States Court at Buffalo Wednesday the Pennsylvania Railroad pleaded guilty to twenty counts on an indictment found in 1907 for granting preferential rates on shipments of oil made by the Standard Oil Company. The New York Central pleaded guilty at the same time to twenty counts of one indictment and fifteen of another indictment for the same offence growing out of the same shipments. These indictments were based on shipments made in 1905. The Standard Oil Company was convicted of securing preferential rates on the same shipments in the United States Court at Buffalo some months ago, its conviction affirmed by the Circuit Court of Appeals for the Second Circuit, and at the present term the United States Supreme Court refused to grant a writ of certiorari to review such judgment of affirmance. The railway companies plead guilty, the Pennsylvania Railroad being fined \$20,000 and the New York Central \$35,000. This disposition of the case was had pursuant to an agreement with the government, and the court in imposing the fines, which were promptly paid, expressed himself as approving the disposition so made. The transaction out of which the offences grew occurred six or seven years ago. The department was satisfied that they had ceased, and for that reason pleas of guilty and the payment of these fines were accepted as a sufficient vindication of the law."

For the information of those who would find a great market for our grain in China, it may be noted that the Chinese Eastern Railway is blocked by the deliveries of grain at the Manchurian stations. At a single station not long ago 1,500 carloads were waiting for cars.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

John Borland Thayer, who was recently elected second vice-president of the Pennsylvania Railroad, was born on April 21, 1862, at Philadelphia, Pa. After leaving the University of Penn-



J. B. Thayer.

sylvania, in 1881 he entered the service of the Pennsylvania Railroad as a clerk in the Empire Line office, and about eighteen months later was transferred to the general freight department. Upon the reorganization of that department he was appointed chief clerk. Three years later he was appointed freight solicitor of the United Railroads of New Jersey division. From February, 1889, to May, 1892, he was out of railway work. He returned to the service of the Pennsylvania Railroad in May, 1892, as division freight agent of the Northern Central, with headquarters at Balti-

more. On December 1, 1894, he was promoted to assistant general freight agent, with office at Philadelphia, and in March, 1897, was made general freight agent in charge of through traffic. In May, 1899, he was appointed general freight agent, also of the Northern Central, Philadelphia, Wilmington & Baltimore, and West Jersey & Seashore railway companies. Mr. Thayer was elected fifth vice-president in charge of traffic on June 1, 1903, and in October, 1905, he became fourth vice-president. On March 24, 1909, he was elected third vice-president. Mr. Thayer is a director of the Long Island Railroad and various subsidiary companies.

Henry Tatnall, whose election as third vice-president of the Pennsylvania Railroad, with office at Philadelphia, Pa., has been announced in these columns, was born April 30, 1855, at Wilming-



Henry Tatnall.

ton, Del. He is a grandson of Edward Tatnall, one of the organizers of the Philadelphia, Wilmington & Baltimore, now a part of the Philadelphia, Baltimore & Washington. Mr. Tatnall was educated in private schools of his native town, and at Westtown Boarding School. His first position was in a real estate office at Wilmington, and in 1879 he entered the service of the Girard Trust Company of Philadelphia as a clerk. Two years later he became the treasurer, and from 1885 to 1900 was the vice-president of that company. In 1900 he became president of the Franklin National

Bank of Philadelphia, and on June 1, 1904, was elected sixth vice-president and treasurer of the Pennsylvania Railroad. He was elected fifth vice-president and treasurer in October, 1905, and in March, 1909, was elected fourth vice-president in charge

of the company's finances; and now becomes third vice president.

William W. Atterbury, fifth vice-president of the Pennsylvania Railroad, who has been elected fourth vice-president, with office at Philadelphia, Pa., was born at New Albany, Ind., January 31, 1866. After receiving a liberal preparatory education, Mr. Atterbury was graduated from Yale University, and began railway work in 1886 as an apprentice in the Altoona shops. From 1889 to 1892 he served as assistant road foreman of engines on various divisions of the Pennsylvania and the Philadelphia, Wilmington & Baltimore. In 1892 he was promoted to assistant engineer of motive power in the Pennsylvania Company's Northwest System, and in 1893, to master mechanic of the Pennsylvania Company at Fort Wayne, Ind. On October 26, 1896, Mr. Atterbury was advanced to general superintendent of motive power of the Pennsylvania Lines East of Pittsburgh and Erie, and was appointed general manager of the Pennsylvania Lines East of Pittsburgh and Erie on January 1, 1903. On March 24, 1909, he was elected fifth vice-president, in charge of transportation, and now becomes fourth vice-president. Mr. Atterbury is a member of the Rittenhouse, Union League and many other clubs of Philadelphia, Pittsburgh, Washington and Baltimore. He is also a member of the American Academy of Political and Social Science, the American Society of Mechanical Engineers and the American Society of Civil Engineers.

William Heyward Myers, general manager of the Pennsylvania Railroad, who has been elected fifth vice-president, with office at Philadelphia, Pa., was born in San Antonio, Tex., April 9, 1856, and was educated in private schools and at the School of Mines of Freiberg, Germany. Mr. Myers began railway work on the Pennsylvania Railroad, January 17, 1876, as rodman in the office of the general supervisor at Altoona. He was appointed assistant supervisor at Downingtown in June, 1876; supervisor at Lancaster in April, 1879; assistant engineer of the Tyrone division in January, 1881; assistant engineer of the Middle division in September, 1881; assistant engineer of the Philadelphia division, January 1, 1884; superintendent of the Bedford division, April 1, 1889; superintendent of the Belvidere division, September 1, 1889; superintendent of the Schuylkill division, January 1, 1891; superintendent Middle division, January 1, 1899. Mr. Myers was appointed general superintendent of the Philadelphia & Erie division and Northern Central, August 1, 1900, and on March 24, 1909, he succeeded W. W. Atterbury as general manager of the Pennsylvania, which position he held until his recent election as fifth vice-president. It is understood that

in his new position Mr. Myers will have charge of the purchasing, real estate and insurance departments, the same departments which heretofore were under Mr. Pugh.

Charles R. Webber has been appointed an assistant to the general counsel of the Baltimore & Ohio, with office at Baltimore, Md.

B. E. Eaton has been appointed general counsel of the Gulf & Ship Island, with office at Gulfport, Miss., succeeding J. H. Neville.

E. W. Clark, superintendent and general freight agent of the Pacific Coast Railway, at San Luis Obispo, Cal., has been elected vice-president.

H. M. Atkinson, receiver of the Atlanta, Birmingham & Atlantic, has been appointed also receiver of the Fitzgerald, Ocilla & Broxton.

W. J. Oliver has been elected president of the Savannah, Augusta & Northern, with office at Knoxville, Tenn.; L. L. Lewis has been elected vice-president, with office at New York, and L. W. Armstrong, general manager and general freight agent, is now auditor and general freight agent, with office at Statesboro, Ga.

The Spokane, Portland & Seattle has taken over under long lease the lines of the Northern Pacific between Willbridge, Ore., and Goble. All of these lines from Willbridge to Holladay, including the line from Warrenton to Fort Stevens, and the Portland terminals, will be known as the Astoria division of the Spokane, Portland & Seattle, and all employees of this new division will report to the general officers of that company.

Operating Officers.

L. E. Wooten has been appointed general manager of the Savannah, Augusta & Northern, with office at Statesboro, Ga.

D. Sullivan has been appointed trainmaster of the Missouri, Oklahoma & Gulf, with office at Calvin, Okla., succeeding E. N. Gates.

W. H. De Witt has been appointed superintendent of the Fort Dodge, Des Moines & Southern, with office at Boone, Iowa, succeeding Frank Arnold.

J. M. Sims has been appointed superintendent and general freight agent of the Pacific Coast Railway, with office at San Luis Obispo, Cal., succeeding E. W. Clark, promoted.

W. C. Loree, superintendent of the Baltimore & Ohio, at Pittsburgh, Pa., has been appointed general manager of the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio. E. A. Peck, superintendent of the Pittsburgh division of the Baltimore & Ohio, succeeds Mr. Loree, with office at Pittsburgh, Pa.

H. F. Clark has been appointed a trainmaster of the Rock Island Lines, with jurisdiction over the territory from Winnfield, La., to Eunice, and roadmaster also of the territory from Milepost 195 to Eunice. Sam Crawford has been appointed a special agent in the operating department, with jurisdiction over the Louisiana division, succeeding R. E. Love, resigned.

M. J. Buckley, whose appointment as acting general manager of the Oregon-Washington Railroad & Navigation Company at Portland, Ore., was announced in the *Railway Age Gazette* of February 10, page 299, has resumed his former position and duties of assistant general manager. J. D. Stack, who was also an assistant general manager, and who temporarily succeeded to the duties of Mr. Buckley, resumes his former office, and L. R. Fields, who temporarily succeeded Mr. Stack, resumes the superintendency at Portland.

Marion J. Wise, whose appointment as superintendent of the Southern Railway Co. in Mississippi, at Columbia, Miss., has been announced in these columns, was born August 16, 1883, in St. Louis county, Mo. He was educated in the public and high schools, and began railway work January 11, 1901, as a clerk in the claim department of the Mobile & Ohio, and in June was appointed a clerk in the rate department. In March of the following year he was transferred to the general manager's office. From April, 1903, to February, 1907, he was secretary to the general manager, and was then appointed chief clerk to the superintendent of transportation. In December,



W. W. Atterbury.



W. H. Myers.

1907, he was appointed chief clerk to the general manager, which position he held at the time of his recent appointment as superintendent.

T. H. Williams, has been appointed assistant superintendent of the Stockton division of the Southern Pacific, with office at Stockton, Cal., succeeding G. D. Wright, assigned to other duties. Mr. Williams was born on March 10, 1877, and began railway work in May, 1892, as car record clerk and car accountant in the office of the Chicago & Alton. From August, 1896, to September, 1906, he was consecutively freight brakeman, switchman, train gateman, clerk in the superintendent's office and chief clerk to the superintendent of car service on the same road. He was then for about ten months car distributor on the Southern Pacific at Oakland, Cal. In July, 1907, he went to the Indiana Harbor Belt Railroad as superintendent of car service and the following November was appointed train and station inspector of the Southern Pacific, which position he held at the time of his recent appointment as assistant superintendent of the Stockton division of that company.

Daniel C. Stewart, whose appointment as superintendent of passenger transportation of the Pennsylvania Railroad has been announced in these columns, was born on April 2, 1862, at New Florence, Pa., and was educated in the public schools of his native town. He began railway work on December 1, 1878, with the Pennsylvania Railroad, as mail carrier, and in September, 1880, became telegraph operator. In July, 1884, he was appointed train despatcher of the Pittsburgh division, remaining in that position until November, 1895, when he was made assistant trainmaster, and from March, 1900, to July, 1902, was assistant trainmaster at Derry. He was then appointed division operator of the Pittsburgh division, becoming passenger trainmaster in July, 1903, and in March, 1905, was made superintendent of telegraph. In April, 1907, he was appointed assistant superintendent of the Pittsburgh division, which position he held at the time of his recent appointment as superintendent of passenger transportation.

Elisha Lee, who was recently appointed assistant to the general manager of the Pennsylvania Railroad, was born in Chicago, September 24, 1870. He was graduated from the Massachusetts Institute of Technology in 1892, and in November of that year, entered the service of the Pennsylvania Railroad in the office of the assistant engineer of the Tyrone division. He was made a rodman in 1897, and on April 17, 1899, was promoted to assistant supervisor on the Western Pennsylvania division. He was then consecutively to August, 1903, assistant supervisor West Jersey & Seashore, assistant supervisor Philadelphia division, supervisor Eastern division Philadelphia & Erie Railroad, supervisor Philadelphia division. On August 20, 1903, he was promoted to division engineer of the Buffalo & Rochester division, and three years later, was appointed division engineer of the Philadelphia Terminal division. On April 1, 1907, he became principal assistant engineer of the Philadelphia, Baltimore & Washington. On March 24, 1909, he was promoted to superintendent of the New York, Philadelphia & Norfolk Railroad, which position he held until his latest appointment.

Robert V. Massey, whose appointment as superintendent of the New York, Philadelphia & Norfolk Railroad, with office at Cape Charles, Va., has been announced in these columns, was born at Dover, Del., on September 29, 1871. He graduated from Yale University in 1892, and the same year began railway work in the engineering department of the Pennsylvania Railroad. In 1895, he was attached to the office of the principal assistant engineer at Altoona, and on November 1 of the same year, he was appointed assistant supervisor on the Western Pennsylvania division. On April 1, 1897, he became assistant supervisor of the Baltimore division, and in April, 1899, assistant supervisor on the middle division. Mr. Massey was promoted to supervisor on the Schuylkill division August 1, 1900. In 1902, he went to the Maryland division in the same capacity, and on December 15, 1905, was transferred to the Pittsburgh division. He became division engineer of the Schuylkill division on April 1, 1907, and on January 1, 1909, was appointed division engineer of the New York division, which position he held until his recent appointment as superintendent of the New York, Philadelphia & Norfolk.

Michael Trump, whose appointment to special duties in connection with transportation problems, on the Pennsylvania Rail-

road, has been announced in these columns, was born March 14, 1854, at Philadelphia, Pa. Mr. Trump was educated at the Friends High School, Philadelphia, and at the Polytechnic College of Pennsylvania, from which he was graduated as a civil engineer in June, 1874. He entered the service of the Pennsylvania Railroad in July, 1880, and was assigned to special duty on the Pittsburg, Virginia & Charleston. The following month he was transferred to the office of the assistant engineer of the Pittsburgh division, and in April, 1881, he was appointed assistant supervisor of Division 10, at Brinton station. In August of the same year he was made assistant supervisor and assistant trainmaster on the Southwest Pennsylvania, and one month later was appointed assistant engineer of the West Pennsylvania Railroad division, at Blairsville. On October 1, 1882, he was transferred to the Pittsburgh division as assistant engineer, and one year later was appointed assistant superintendent. In February, 1897, he was appointed general superintendent of transportation, which position he held until his recent assignment to special duties on transportation problems in connection with the regulations of the national and state railway commissions.

Charles Miller Sheaffer, who has been appointed general superintendent of transportation of the Pennsylvania Railroad, with office at Philadelphia, Pa., was born on March 4, 1858, at



C. M. Sheaffer.

Pittsburgh, Pa., and graduated from the commercial department of the Pittsburgh Central High School in June, 1874. He entered the service of the Pennsylvania Railroad on April 1, 1877, as a messenger in the superintendent's office of the Pittsburgh division, and has been in the continuous service of the company ever since; consecutively as telegraph operator, yard master, train despatcher and division operator. From July 1, 1901, to June, 1903, he was superintendent of telegraph; he was then promoted to superintendent of passenger transportation,

which position he held at the time of his recent appointment as general superintendent of transportation.

Clinton Lloyd Bardo, whose resignation as superintendent of the electric division of the New York Central & Hudson River was recently announced in these columns, has been appointed assistant to the general manager of the Lehigh Valley, with office at South Bethlehem, Pa. Mr. Bardo was born on October 24, 1867, at Montgomery, Pa., and began railway work May 30, 1885, with the Pennsylvania Railroad as an extra operator on the Eastern and Susquehanna divisions, Philadelphia & Erie Railroad division. The following December he was appointed an operator at Beaver Valley and Tamamend on the Catawissa division of the Philadelphia & Reading. From May, 1886, to November of the following year he was telegraph operator and supply agent of the Tidewater Oil Company in the construction department at Mauch Chunk, and then went to the Lehigh Valley as telegraph operator and train despatcher at Wilkesbarre. In May, 1892, he was appointed assistant trainmaster of the Wyoming division, and in September of the same year was promoted to trainmaster of the same division of the Lehigh Valley. He was transferred in May, 1901, to the New York division, and in November, 1904, he went as freight trainmaster to the New York division of the New York, New Haven & Hartford at Harlem river, N. Y. From December, 1905, to June, 1907, he was assistant superintendent of the same division, and since June, 1907, was superintendent of the Grand Central station and the Electric division of the New York Central & Hudson River. As superintendent of the Electric division and Grand Central terminal Mr. Bardo has had to handle what is perhaps the

most congested traffic in the country. Between the terminal and the Mott Haven yards—4½ miles—there are 700 movements in 24 hours. During the past three years the traffic has been handled without interruption in the midst of confusion of an entire reconstruction of the terminal. Mr. Bardo is especially known for his success in dealing with his men. While other superintendents have been harassed by labor organizations and have seen their forces demoralized, he has enforced without compromise an even handed discipline. The morale has been steadily lifted and held inflexible on an unusually high basis. It is interesting that this rigid insistence on discipline has come not only to command the respect of the men individually, but the active official co-operation of their brotherhoods. This has had formal expression in the visit at different times of committees instructed to assure the superintendent that his vigorous discipline had their endorsement. The "investigations" have been model procedures, penalties have been visited with certainty, but with explicit statement of the offenses and explanation of the automatic character of the penalty. The discipline has been without fear or favor, and without the admixture of the personal element, which so often defeats the ends of corrective measures.

Simon Cameron Long, whose appointment as general manager of the Pennsylvania Railroad, has been announced in these columns, was born September 7, 1857, near Harrisburg, Pa., and



S. C. Long.

was educated in the public schools of Pine Grove, and at Lafayette College, from which he graduated in June, 1877, with the degree of C.E. He began railway work with the Philadelphia & Reading upon leaving college, and went to the engineering department of the Pennsylvania Railroad April 3, 1881, and in April, 1882, he was transferred to the general superintendent's office at Altoona. From November, 1882, until May of the following year he was assistant supervisor in the Pittsburgh yard, when he was transferred in the same capacity to Walls, now Pitcairn, and in August, 1884, he was again transferred in the same capacity to the Philadelphia yard. He was promoted to supervisor in February, 1885. From November, 1889, to January, 1893, he was assistant engineer of the Delaware division, and was then transferred to the Maryland division. On August 1, 1900, he became superintendent of the Bedford division, and in May, 1902, was transferred to the River division of the Allegheny Valley Railroad. Mr. Long was appointed superintendent of the Pittsburgh division in January, 1903, and on April 1, 1907, was promoted to general superintendent of the Western Pennsylvania division, which position he held at the time of his recent appointment as general manager.

Traffic Officers.

L. D. Bell has been appointed a commercial agent of the Missouri & North Arkansas, with office at Joplin, Mo.

W. H. Waters has been appointed a soliciting freight agent of the Mobile & Ohio, with office at St. Louis, Mo.

J. C. Ewing has been appointed a commercial agent of the Fort Dodge, Des Moines & Southern, with office at Minneapolis, Minn.

A. V. Harger, traveling passenger agent of the Baltimore & Ohio, with office at Chicago, has resigned to engage in other business.

E. Harding has been appointed a commercial agent of the Rock Island lines, with office at McAlester, Okla., succeeding A. D. Aiken, promoted.

C. R. Coughlin, coal agent of the Chicago, Terre Haute & Southeastern at Chicago, has been appointed a commercial agent, with office at Chicago.

C. H. Helpling has been appointed chief of the tariff bureau of the Western Pacific, with office at San Francisco, Cal., succeeding H. G. Toll, resigned.

J. W. Platt has been appointed a traveling freight agent of the Cincinnati, New Orleans & Texas Pacific, with office at Cincinnati, Ohio, succeeding R. Hamilton, transferred.

M. R. Sutton, formerly general agent of the Colorado Midland at Kansas City, Mo., has been reappointed to that position. The office was abolished on June 30, 1910, and is now reopened.

G. L. Albert has been appointed secretary of the Southern Demurrage and Storage Bureau, with office at New Orleans, La., succeeding R. L. Jones, resigned to accept service with the Missouri Pacific.

A. G. Busch, formerly traveling freight agent of the Missouri Pacific, at Cincinnati, Ohio, has been appointed a commercial agent of the Louisiana & Arkansas, with office at Shreveport, La.

H. B. Tooker, general freight and passenger agent of the Ray & Gila Valley, at Kelvin, Ariz., has been appointed also general freight and passenger agent of the Bingham & Garfield, a road under construction in Utah.

L. B. Shepherd, city passenger agent of the Chicago & Alton at Kansas City, Mo., has been appointed a traveling passenger agent, with office at Denver, Colo., succeeding C. J. Kays, resigned. T. M. Sommers succeeds Mr. Shepherd.

F. H. Judson, soliciting freight agent of the Union Pacific at Kansas City, Mo., has resigned to engage in other business, and J. M. Mills, also a soliciting freight agent at Kansas City, succeeds to the duties of Mr. Judson. R. A. Peters succeeds Mr. Mills.

Isaac Benson, traveling freight agent of the St. Louis & San Francisco at Cincinnati, Ohio, has been appointed commercial agent, with office at Indianapolis, Ind., a new agency. J. J. Gartner, traveling passenger agent of the Northern Pacific at Cincinnati, has been appointed a traveling freight agent of the Frisco, with office at Indianapolis. L. B. Williams, soliciting freight agent at Cincinnati, succeeds Mr. Benson as traveling freight agent, and Robert McDowell succeeds Mr. Williams.

John A. Scott, who has been appointed general passenger agent of the Illinois Central and the Yazoo & Mississippi Valley, with office at Memphis, Tenn., as was previously announced



J. A. Scott.

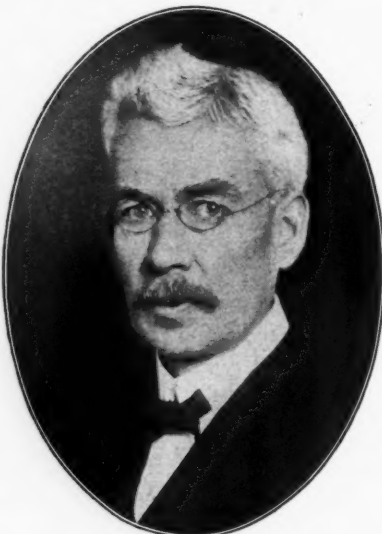
in these columns, was born March 1, 1865 at Memphis. He was educated in the public schools and began railway work in September, 1880, in the superintendent's office of the Louisville & Nashville at Memphis. Two years later he was made assistant ticket agent; for four years from 1884 he was city passenger agent, and was then ticket agent for five years. In 1893 he became general agent of the Kansas City, Ft. Scott & Memphis, and returned to the Illinois Central and the Yazoo & Mississippi Valley as division passenger agent in 1896.

He was promoted to assistant general passenger agent at Memphis in 1903, which position he held until he was appointed general passenger agent on March 1, 1911.

T. R. Farrell, chief clerk in the general traffic department of the Wabash at St. Louis, Mo., has been appointed an assistant general freight agent, with office at St. Louis, succeeding W. H. Wylie, resigned to engage in other business. W. E. Creamer, traveling freight agent at Kansas City, Mo., has

been appointed a general agent, with office at St. Joseph, Mo., succeeding George A. McFarland, who takes Mr. Farrell's place as chief clerk in St. Louis. L. C. Hodkins, contracting freight agent at Kansas City, succeeds Mr. Creamer.

Harry George Elliott, whose appointment as general passenger agent of the Grand Trunk, with office at Montreal, Que., has been announced in these columns, was born on August 22, 1860. He began railway work in 1882, as city ticket agent of the Central Vermont, at Montreal, remaining in that position until April, 1897. From May to June, 1897, he was ticket agent of the Grand Trunk, at Montreal, and in July of the same year he was made excursion clerk in the general passenger and ticket department. From August, 1899, to April, 1900, he was chief clerk in the same department, and was appointed assistant general passenger and ticket agent in May, 1900, remaining in that position until June, 1909. The following month he was appointed first assistant general passenger agent at Montreal, and since June 15, 1910, until his recent appointment, he was first assistant general passenger agent of the same company, at Chicago.



H. G. Elliott.

James D. McDonald, whose appointment as assistant general passenger agent of the Grand Trunk, with office at Chicago, has been announced in these columns, was born at Toronto, Ont., August 27, 1855. He received his education in the public schools and began railway work in September, 1868, with the Grand Trunk. In 1869 he was made assistant ticket clerk at Toronto, and six years later was appointed ticket agent at Buffalo, N. Y. He was promoted to city passenger and ticket agent at Buffalo in May, 1896, and six years later was appointed district passenger agent, with office at Toronto, which office he held until he was appointed assistant general passenger agent as above.

James Alfred Stewart, whose appointment as general passenger agent of the Chicago, Rock Island & Pacific, with office at Topeka, Kan., has been announced in these columns, was born



J. A. Stewart.

at Pittsburgh, Pa., traveling passenger agent at Kansas City, Mo., and city passenger agent and division passenger agent at

September 8, 1867, at London, Ont. He received a high school education, and began railway work December 5, 1881, as a messenger in the freight department of the Great Western Railway of Canada. Two years later he was appointed ticket clerk, and in 1885 went with the Union Pacific, first as freight clerk at Abilene, Kan., and then as chief clerk at Salina, Kan. He went with the Chicago, Rock Island & Pacific in May, 1888, as freight clerk at Kansas City, Mo., and he was then promoted consecutively to traveling passenger agent at Chicago, south-eastern passenger agent

Des Moines, Ia. In April, 1901, he was appointed general agent at Kansas City, Mo., and was later promoted to assistant general freight agent, remaining in Kansas City until December, 1909. He was then appointed first assistant general passenger agent, with office at Chicago, which office he held until his recent promotion to general passenger agent at Topeka.

Engineering and Rolling Stock Officers.

C. H. Montague has been appointed master mechanic of the Quincy, Omaha & Kansas City, with office at Milan, Mo., succeeding A. W. Quackenbush.

A. S. Bland, assistant division engineer of the Pennsylvania Lines West at Fort Wayne, Ind., has been appointed assistant engineer on the Chicago terminal division, with office at Chicago.

G. B. Herington, division engineer of the Sacramento division of the Southern Pacific, at Sacramento, Cal., has resigned to become superintendent of construction of the Mountain Quarries Co. Railroad, with headquarters at Auburn.

C. H. Niemeyer, division engineer of the Conemaugh division of the Pennsylvania Railroad, at Pittsburgh, Pa., has been transferred to the Pittsburgh division, and F. W. Smith, Jr., supervisor of the Philadelphia Terminal division, at West Philadelphia, succeeds Mr. Niemeyer, both with offices at Pittsburgh. C. I. Leiper, division engineer of the New York Terminal division, at New York, has been transferred to the New York division, with office at Jersey City, N. J., and J. H. Harris, division engineer of the Delaware division, at Wilmington, Del., succeeds Mr. Leiper; W. F. Greene, division engineer of the Philadelphia Terminal division, at West Philadelphia, Pa., succeeds Mr. Harris, and W. T. Covert, division engineer of the Williamsport division, at Williamsport, succeeds Mr. Greene. G. R. Sinnickson, supervisor of Division No. 2 of the Philadelphia division, at Paoli, has been appointed division engineer of the Williamsport and Susquehanna divisions, with office at Williamsport; J. Schimmel, Jr., supervisor of the Schuylkill division, at Reading, succeeds Mr. Sinnickson; D. C. Baird, assistant supervisor of the Pittsburgh division, at Pitcairn, succeeds Mr. Schimmel, and M. J. Jones, assistant supervisor of the Bellwood division, succeeds Mr. Baird. S. E. Holland, supervisor of the Cresson division, at Barnesboro, has been transferred to the Philadelphia Terminal division, with office at West Philadelphia; R. R. Nace, assistant supervisor of the Maryland division at Lamokin, succeeds Mr. Holland; N. D. Vernon, assistant supervisor of the Monongahela division, at Dravosburg, succeeds Mr. Nace, and W. T. Bevan, transitman in the office of the engineer maintenance of way, succeeds Mr. Vernon. R. L. Fleming, transitman in the office of the engineer maintenance of way, has been appointed assistant supervisor of the Conemaugh division, with office at Blairsville.

Purchasing Officers.

F. M. Johnston, auditor of the Fort Dodge, Des Moines & Southern, at Boone, Iowa, has been appointed also purchasing agent, succeeding in that capacity J. L. Blake, resigned to engage in other business.

OBITUARY.

Edward W. Madden, assistant trainmaster of the middle division of the Pennsylvania Railroad, at Harrisburg, Pa., died on March 5.

W. R. Kelly, general counsel of the San Pedro, Los Angeles & Salt Lake at Los Angeles, Cal., and formerly general solicitor of the Union Pacific at Omaha, Neb., died in Los Angeles on March 9. Mr. Kelly was born in Perry county, Ohio, in January, 1849, and received his training as an attorney at Clinton, Ill. He became general solicitor of the Union Pacific in 1895, having previously had charge of the law business of that road in Nebraska. He went to Los Angeles in 1906, and has been with the San Pedro, Los Angeles & Salt Lake since 1907.

John Sloan, formerly roadmaster of the St. Louis, Iron Mountain & Southern at Arkadelphia, Ark., died recently at Conway, Ark. Mr. Sloan was born in Ireland and came to Illinois when a child. He worked at grading and construction work on

different Illinois roads in the sixties, and was consecutively track foreman, roadmaster and general roadmaster of the old Indiana, Bloomington & Western, now the Peoria & Eastern. He then went to the St. Louis, Iron Mountain & Southern as roadmaster, and he retired about ten years ago on account of ill health. He was one of the early presidents of the Roadmasters' Association.

Howard E. Laing, for twenty-five years city passenger agent of the Chicago, Milwaukee & St. Paul, died in Chicago Tuesday.

Kenyon Cox, formerly a prominent railway man, died at his home at Long Beach, Cal., on March 13, at the age of 80 years. He was interested in the construction of the Canada Southern and in other railway enterprises. He leaves a widow, a son, and a brother, Charles F. Cox, treasurer of the Michigan Central and other New York Central Lines west of Buffalo.

Hale D. Judson, general superintendent of the Chicago, Burlington & Quincy, with office at Galesburg, Ill., died at Rockport, Texas, on March 11. Mr. Judson was born May 30, 1853, at Waupaca, Wis., and began railway work in 1872 as a telegraph operator on the Chicago & Iowa. A year later he was promoted to agent, was train despatcher for ten years from 1875, and from 1885 to 1890 was general superintendent. When the Chicago & Iowa was absorbed by the Chicago, Burlington & Quincy he was appointed superintendent of the Chicago division of the Burlington and in 1902 he was made superintendent of the Illinois lines. Two years later he was promoted to general superintendent, with office at Chicago, and in February, 1910, was transferred with the same title to Galesburg, Ill.

Joseph W. Maxwell, general superintendent of the St. Louis Southwestern and first vice-president and general superintendent of the St. Louis Southwestern of Texas, with office at Tyler, Tex., died at his home in Tyler on March 7, as was previously announced in these columns. Mr. Maxwell was born October 18, 1851, at Urichville, Ohio, and began railway work as a messenger for the Pittsburgh, Cincinnati & St. Louis in 1866. The next year he was promoted to telegraph operator, and in 1870 went with the Missouri Pacific as a train despatcher. From 1871 to 1882 he was train despatcher at different times for the Missouri, Kansas & Texas and the St. Louis, Iron Mountain & Southern. He was then made trainmaster of the latter road, and held the same office consecutively on the Wabash, the St. Louis, Arkansas & Texas and the Missouri, Kansas & Texas until January, 1887, when he was appointed division superintendent of the Missouri, Kansas & Texas. Five years later he was promoted to superintendent and in 1895 to general superintendent. He was appointed assistant general manager in July, 1903, and held that office until three years ago, when he went with the St. Louis Southwestern as vice-president and general superintendent in Texas.

FOREIGN RAILWAY NOTES.

The legislature of the state of Sao Paulo, Brazil, has authorized the construction of a line between Itiacy and Campinas. This line will connect all the lines of 3 ft. gage of the states of Minas Geraes, Sao Paulo, Goyaz, Matto, Grosso, Parana, Rio de Janeiro and Espirito Santo with Rio Grande do Sul and the republics of the River Plata and Paraguay on the southern frontier.

In some respects the Sunning railway is the most promising line in all China. It was capitalized, planned, engineered, and constructed by Chinese, without any foreign help whatever. If it has technical faults and is not run altogether in accordance with foreign ideas, it is nevertheless an effective line, prosperous and well managed, so far as results can show, and is a standing example of what Chinese effort and Chinese talent will accomplish in China in the near future.

The most active railway construction work being carried on in the north of Brazil is that at present in the hands of the South American Construction Company in connection with the system in the state of Ceara, known as the North Eastern Railway. Final approval has been given by the government for the construction by the contractors of a total of about 100 miles of line, comprising 49 miles from M. Calmon to Iquatu, 13 miles for a branch to Cedro and 37 miles for a branch connection between the Sobral and the Baturite railways. The total appropriation for this work is \$2,348,000.

Railway Construction.

New Incorporations, Surveys, Etc.

BIRMINGHAM & NORTHWESTERN.—An officer writes that bids will be let about April 1, to build from Dyersburg, Tenn., southeast via Friendship, Crockett Mills, Alamo and Bells to Jackson, about 45 miles. The work will be light and calls for handling about 10,000 cubic yards a mile. Maximum grades will be 0.5 per cent. and maximum curvature 3 degrees. There will be a 70-ft. steel bridge and a trestle over Forked Deer river. R. M. Hall, president, and Mike Harvey, chief engineer, Dyersburg. (October 28, p. 809.)

BUFFALO, ROCHESTER & PITTSBURGH.—A contract has been given to the Miller Construction Company, Lock Haven, Pa., for work between Mount Jewett, Pa., and Johnsonburg. This includes handling about 300,000 cu. yds. of earth and reducing the curves and alinement.

BURR'S FERRY, BROWNEDEL & CHESTER.—An officer writes that there is no immediate prospect of extending this line to Burkeville, Texas. The company is in the market for a 100-ft. steel bridge.

CANADIAN NORTHERN.—This company is said to be making surveys from Cook, Minn., on the Rainy Lake division, to Point island and east of that place.

CANADIAN PACIFIC.—The railway committee of the Canadian House of Commons has approved a bill which authorizes this company to build about 1,000 miles of branch lines in the western provinces of Canada, and also authorizes the company to issue securities amounting to \$30,000 a mile for such lines.

CIRCUIT TERMINAL.—An officer writes that this company expects to lay about 31 miles of track around Indianapolis, Ind., during March. The work is being carried out by the company with its own men. There will be six steel bridges, four trestles and one tunnel. O. W. Johnson, president; H. Holton, general manager, and J. A. Shafer, chief engineer, Meridian Life building, Indianapolis.

COLORADO, OKLAHOMA & NEW ORLEANS.—Incorporated in Oklahoma with \$55,000,000 capital and headquarters at Oklahoma City, Okla. The company was organized to build from Trinidad, Colo., southeast through Texas, Oklahoma, Arkansas and Louisiana to New Orleans. W. J. Thompson, W. L. Peck, L. T. Poole, C. F. Woodward, S. A. Horton and D. J. Grigsby, Oklahoma City, Okla., are incorporators.

CONNECTICUT ROADS (Electric).—A contract has been given to the Aetna Construction Company, New Haven, Conn., to build an electric line from Bridgeport, Conn., to Danbury. The work is to be started at once, and includes a 400-ft. steel bridge, and some small concrete bridges.

COPPER RIVER & NORTHWESTERN.—See item regarding this company on page 513.

DULUTH & IRON RANGE.—A new branch, called the Eastern Missabe branch, has been opened for business from Missabe, Minn., north to Boulder, 11 miles.

FARMINGTON, ALBUQUERQUE & GULF.—Residents of Farmington, N. Mex., have organized this company. Surveys will be made, and rights-of-way will be secured soon, it is said, from Farmington, southeast to Albuquerque, about 150 miles.

GRAND TRUNK PACIFIC.—This company is pushing work on a 60-mile branch from Edson, Alb., which is 129 miles west of Edmonton, southwesterly to reach large coal fields that are being developed in the Yellow Head Pass country.

This road has been extended from Edmonton, Alb., west to Edson, 130 miles.

INDIANAPOLIS & DELPHI TRACTION.—Incorporated in Indiana with \$100,000 capital, to build from Carmel, Ind., northwest to Delphi. The first section to be built will be from Carmel to Sheridan, about 15 miles, on which grading work is to be started soon. H. L. Smith, Indianapolis; M. E. Cox, W. M. Mendenhall, Westfield, and E. Thistlewaite, Sheridan, are incorporators.

LAKE ERIE AND NORTHERN.—The Railway Committee of the Canadian House of Commons has passed the bill authorizing this company to build from Port Dover, Ont., on Lake Erie, via Simcoe, Waterford and Brantford to Paris, thence to Galt,

with a branch from Paris to Glenmorris and Ayr. The company is authorized to issue securities for an amount not to exceed \$30,000 a mile. J. Muir, R. Ryerson, W. S. Brewster and W. D. Schultz, all of Brantford, are interested. (January 13, p. 104.)

MEXICAN PACIFIC.—Final arrangements have been made to build this road, it is said, from Salina Cruz, Mexico, west through the territories of Oaxaca and Guerrero to Acapulco harbor on the Pacific coast. Joseph Castlelot, vice-president, Mexico City, Mexico.

MEXICAN ROADS.—According to press reports, the Oaxaca Coal & Iron Co. has plans well under way for building an extensive system of railways in southeastern Mexico. The company owns large iron ore fields in the state of Oaxaca, and a line will be built to connect the iron deposits with the coal fields. A north and south line from Puebla is to be built through Oaxaca and the Rio Verde valley.

NATIONAL RAILWAYS OF MEXICO.—Contracts are said to have been given by this company for building new lines in Durango, Mex., and Zacatecas, as follows: To the Campania Brancaria de Obras y Bienes Raices, for building about 105 miles out of Durango City, and to the International Contracting Company to build from Canitas, Zacatecas to Sombrerete.

NORTHERN PACIFIC.—An officer is quoted as saying that construction work will be started at once on the line between the Tacoma, Wash., water front and Tenino. The right-of-way around the west water front of Tacoma has been secured. The work will be heavy and includes piercing two tunnels. (January 20, p. 143.)

OREGON ROADS.—A company has been organized in Kansas City, Mo., with a capital of \$50,000, to build a line to connect Hartford, Ark., Huntington, Mansfield and Midland. The headquarters of the company will be at Huntington. It is understood that the Rock Island interests are back of the project.

PANUO MOUNTAIN & MONCLOVA.—This road is now in operation from Monclova, Mex., southeast to Panuco, 42 miles.

PITTSBURGH, BUTLER, SLIPPERY ROCK, GROVE CITY & NORTHERN (Electric).—This company, which was recently chartered in Pennsylvania, expects to begin work about June 1. The plans call for building about 66 miles of line at a cost of \$3,500,000. A line is to be built from Butler, Pa., to Grove City, 26 miles, from which point it is to be extended to Meadville. Right-of-way has been secured on the first 26 miles from Butler. C. Gibson, Jr., president, and J. H. Barrett, engineer. J. C. Kerr, Slippery Rock, and W. N. Galbraith, Pittsburgh, are directors.

PITTSBURGH & SHAWMUT.—A contract has been given to the Miller Construction Company, Lock Haven, Pa., for grading nine miles of the Pittsburgh, Shawmut & Northern east of Kittanning. There will be a large number of cuts, and the work involves handling some 800,000 cu. yds. of rock and earth.

PITTSBURGH, SHAWMUT & NORTHERN.—See Pittsburgh & Shawmut.

ROCKPORT & PORT ARKANSAS.—An officer writes that as soon as the location of the harbor line has been made contracts will be let for work between Rockport City, Tex., and tidewater on Harbor island. About half the grading has already been finished. There will be a large amount of fill work. Maximum grades will be 4 degrees. About two miles of trestles are to be constructed, mostly through boggy lands, and there will be one steel bridge. The company expects to put up docks, wharves and buildings. C. G. Johnson, president; Percival & Son, engineers and contractors, both at Rockport.

SAN ANTONIO, RIO GRANDE & TAMPICO.—According to press reports, work has been resumed on this line, which is to be built from San Antonio, Tex., southwest to a point in La Salle county, about 90 miles, and eventually extended to a point in Mexico. Grading work has already been finished on a section of 25 miles north to Jourdanton, and grading is now under way between Jourdanton and San Antonio. Right-of-way has been secured for the first section of 90 miles, which it is expected will be finished during 1911. J. F. Edwards, president, St. Louis, Mo., and G. W. Nock, chief engineer, San Antonio, Tex.

ST. LOUIS, BROWNSVILLE & MEXICO.—The new Brownsville-

Matamoros international railway route is to be formally opened for through freight and passenger traffic about April 15. It is planned to inaugurate a through Pullman service between New Orleans and the city of Mexico via the new route.

ST. LOUIS, OKLAHOMA & SOUTHERN.—This company has recently been reorganized and it is understood that work will be pushed to completion on a line from South West City, Mo., southwest via Tahlequah, Okla., to Muskogee. The line is eventually to be extended to Honey Grove, Tex. Grading has been finished to Tahlequah, and some of the ties have been laid. The northern terminus will eventually be at Joplin, Mo. C. E. Thomas, E. A. Peters, St. Louis, Mo.; S. Cook, East St. Louis, Ill.; J. B. McDonald, New York, and A. D. Marshall, Dover, Del., are interested.

TUSCALOOSA MINERAL.—According to press reports, this company is securing rights-of-way from Tuscaloosa, Ala., east to Brookwood, 20 miles, and it is expected that construction work will be started at once. The company plans to put up a new station in Tuscaloosa, to cost \$30,000. F. G. Blair, president. Woolsey Finnell, Tuscaloosa, may be addressed. (December 2, p. 1907.)

TWIN CITY LIGHT & TRACTION COMPANY.—This company, it is said, will extend its line to a connection with the Grays Harbor & Puget Sound.

UNION PACIFIC.—An officer writes that this company has authorized laying double-track between Council Bluffs, Iowa, and Ogden, Utah, as follows: At Lexington yard, Neb., 0.27 miles; from O'Fallon to Julesburg, Colo., 64.52 miles, and Dana, Wyo., to Rawlins, 29.92 miles, a total of 94.71 miles. The company already has double track in operation between Council Bluffs, Iowa, and Ogden on 534.54 miles, and between Julesburg, Colo., and Denver on 4.81 miles.

UNITED RAILWAYS COMPANY (Electric).—Train service on this road has been extended from Burlington, Ore., to North Plains, 11.2 miles.

UTAH ROADS.—The Union Coal Co. will be incorporated in Utah with \$1,500,000 capital, to develop coal lands and to build a railway from Helper, Carbon county, Utah, west about eight miles. J. H. Moyle and R. Van Cote, Salt Lake City; A. N. Holdaway and G. M. Smoot, Provo, and J. Barbeglie, Helper, are interested.

WINSTON-SALEM SOUTHBOUND.—Train service has been extended from Whitney, N. C., to Albemarle, 10 miles.

FOREIGN RAILWAY NOTES.

In view of the increasing volume of traffic to Rhodesia, Africa, from the south, the Mashonaland Railway Company, by which the whole line from Beira to Broken Hill is at present worked, has decided that the headquarters of the railways should be removed from Umtali to a more central position. Buluwaiyo, British South Africa, has been selected, because it is the most important railway junction on the system, and the transfer will be effected as rapidly as possible.

A concession has been granted by the Spanish government to MacArthur Bros. & Co., an American firm, to build a railway which will parallel the Northern. This road has been in project since 1892, when a Spanish company obtained the concession for its construction, but little more was done by this company than to purchase the right of way. It is understood that the American company has secured a majority of the stock of holdings of the old Spanish company.

The short section of the Sunning railway between Kung-yik and Tow-shan, China, which was opened to traffic last year, has proved profitable and its extension to Sun-wui, whence it would have water connection with Hongkong, is expected in the near future. The earnings of the railway have averaged about \$10,000 a month. The road was built with funds three-fourths of which were raised by Chinese from the Sunning district living in California and the remainder locally. All of its cars and most of its locomotives were made in the United States. The promoter of the railway was a Chinese who had spent many years in America.

Railway Financial News.

ASTORIA & COLUMBIA RIVER.—See Spokane, Portland & Seattle.

FITZGERALD, OCILLA & BROXTON.—H. M. Atkinson has been appointed receiver of the Fitzgerald, Ocilla & Broxton by Judge Whipple of the Cordele Circuit. The F. O. B. is a subsidiary of the Atlanta, Birmingham & Atlanta, and runs from Broxton, Ga., to Fitzgerald, 23 miles.

FONDA, JOHNSTOWN & GLOVERSVILLE.—Ladenburg, Thalmann & Co., of New York, have purchased the balance of Fonda, Johnstown & Gloversville 4½ per cent. bonds, due 1952, unissued under the first consolidated general refunding mortgage, making it a closed mortgage. These bonds were recently authorized by the Public Service Commission for the Second district of New York.

HOCKING VALLEY.—A press despatch from Columbus, Ohio, says that attorneys for the Hocking Valley have made a proposition to Attorney General Hogan of Ohio that both sides unite in making the Ohio Supreme Court hear as soon as possible all of the ouster suits which have been brought against the company; and the attorneys agree to abide by the Ohio Supreme Court's decision as final.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—The directors have authorized an increase of 21 per cent. in the capital stock. Each stockholder will have the right to subscribe at par for seven shares of preferred and 14 shares of common for every 100 shares of stock held.

MISSOURI PACIFIC.—At the annual meeting of stockholders on March 14, Paul M. Warburg, E. D. Adams, E. L. Marston, George J. Gould, Edwin Gould, Kingdon Gould, E. T. Jeffrey, F. T. Gates, Cornelius Vanderbilt, E. B. Pryor, S. F. Pryor, Charles S. Clarke and R. Lancaster Williams were elected directors. This election, it is understood, carries out the agreement made between George Gould and the banking interests which have recently announced their intention of taking an active part in the management of the property. R. Lancaster Williams is a member of the banking firm of Middendorf, Williams & Co., of Baltimore, and he is understood to represent independent stockholders, of whom Frank Gould has the largest individual holdings. A few days before the annual election a statement was given out by Frank Gould in which he said that he had given his proxies to Mr. Williams, believing that the best interests of the property would be served by having a director on the board who should represent neither the banking interests nor the Gould estate interests. A statement to the same effect was given out by Middendorf, Williams & Co. It is understood that C. S. Clarke, who is vice-president of the Missouri Pacific, will resign from the board of directors when the new president of the Missouri Pacific is appointed.

NEW YORK CENTRAL & HUDSON RIVER.—The New York Public Service Commission, Second district, has given the company authority to issue its \$30,000,000 three-year notes, to be sold at a price which shall cost the company not more than 5 per cent. for its money.

NORFOLK TERMINAL RAILWAY.—Stockholders are to vote March 20 on the question of authorizing \$2,000,000 mortgage bonds to provide money to pay for terminal facilities and build a station and railway. Stockholders are also to vote on the question of making a lease of these facilities to the Virginian Railway and Norfolk & Western and the Norfolk Southern. The company was incorporated in 1910 to build a union passenger station.

NORTHERN PACIFIC.—See Spokane, Portland & Seattle.

OLD COLONY RAILROAD.—The company sold at auction on March 15 \$800,000 par value stock recently authorized by the Massachusetts Railroad Commission.

PENNSYLVANIA RAILROAD.—Stockholders have voted to approve of increasing the capital stock by \$100,000,000, and have voted to approve the increases in pensions made by the directors and the acquisition of the Ridgeway & Clearfield Railway.

READING CO.—The New York Stock Exchange has listed \$9,155,000 Reading Company and Philadelphia & Reading Coal & Iron general mortgage 4½ per cent. bonds, due 1997, with authority to add \$11,188,000 additional bonds on the notice of sale. Of

the total \$20,343,000 bonds, \$1,532,000 were issued to pay for new equipment and \$18,811,000 were issued to retire a like amount of consolidated mortgage bonds due June 1, 1911.

SPOKANE, PORTLAND & SEATTLE.—This company has bought the property of the Astoria & Columbia River Railroad, and the Columbia River has ceased to be an operating company. The S. P. & S. has also leased for a long period the Northern Pacific line between Willbridge, Ore., and Goble. The revenues and operating accounts heretofore kept under the name of the Astoria & Columbia River and leased lines will become a part of the accounts of the Spokane, Portland & Seattle.

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—Frank J. Gould, R. M. Galloway and O. L. Garrison have been elected directors, succeeding John T. Terry, H. B. Henson and Lawrence Greer.

ST. LOUIS, OKLAHOMA & SOUTHERN.—See Railway Construction News in regard to sale of this property.

TEMPLE & NORTHWESTERN.—In connection with the recent sale of this property to interests represented by C. F. Carter, the assistant attorney general of Texas has been asked to give an opinion as to whether the Texas Central can legally lease the Temple & Northwestern. The Temple & Northwestern in part parallels the Missouri, Kansas & Texas, which controls the Texas Central.

TEXAS CENTRAL.—See Temple & Northwestern.

TEXAS & PACIFIC.—E. L. Marston has been elected a director, succeeding Winslow S. Pierce, resigned, and John L. Milbank succeeding Thomas P. Eckert, deceased. Other directors were re-elected.

UNDERGROUND ELECTRIC OF LONDON.—The entire issue of £1,000,000 (\$5,000,000) 5 per cent. prior lien bonds, callable at par but due in 1920, have been called for redemption. The company has sold in order to make this payment part of the 4 per cent. preferred stock of the London Electric Railway comprised in the collateral security for the prior lien bonds and junior issues.

WABASH-PITTSBURGH TERMINAL.—The *Wall Street Journal* of March 13 says: "By far the most important development of the past six months in the reorganization and affairs of the Wabash-Pittsburgh Terminal is an agreement just entered into between the Chaplin and the Wallace first mortgage protective committees, by which the two committees will effect a consolidation and will hereafter co-operate in bringing about the reorganization of the properties. On every point at issue between the two committees the Chaplin committee has won a signal victory. The entire membership of five comprising the Chaplin committee will be on the new consolidation committee, while only five of the Wallace committee will remain and five will be dropped. The new committee will act without a chairman, but a sub-committee will be appointed, composed of James N. Wallace and Haley Fiske, of the Wallace committee, and James C. Chaplin and Richard Sutro, of the Chaplin committee. Mr. Wallace will be chairman of the sub-committee."

WISCONSIN & MICHIGAN.—It is understood that control of this property has been bought by John Marsh, a railway contractor of Iron Mountain, Mich.

Emilio Carrasco, the concessionaire of a trans-Andean line which will start from Salta in the Argentine Republic, has selected the port of Mejillones, Chile, as the terminus of the line on the Pacific ocean. According to the concessionaire, the selection of Mejillones is due to the unusual advantages which it offers to the shipment of nitrate, particularly that produced in the southern section of the department of Tocopilla. This zone abounds in nitrate, but the deposits have never been exploited, because of the lack of adequate transportation facilities. Mr. Carrasco will begin the construction by first building the section between Mejillones and the nitrate zone, in Aguas Blancas and Boquete, so as to expedite exploitation. When the bill granting subsidies to private railways shall have passed the national congress, he will then extend the line to Salta. The concessionaire is also considering the construction of a branch line from Mejillones to Antofagasta, connecting the trunk line.

Supply Trade Section.

The Isthmian Canal Commission will receive bids until April 5 on lubricating oils and greases for all types of engines. Circular No. 624. Bids on cross and switch ties will be opened April 10. Circular No. 625.

H. E. Creer, general car foreman of the Missouri Pacific at Atchison, Kan., has resigned to become mechanical expert for McCord & Company, Chicago, succeeding the late D. J. McOscar, who died on December 22, 1910. Mr. Creer's headquarters will be in Chicago.

The Pawling & Harnischfeger Company, Milwaukee, Wis., has elected the following directors: S. H. Squier, W. H. Hassenplug and F. P. Breck. Mr. Squier has been elected also secretary, and Mr. Hassenplug, formerly sales manager, has been elected also second vice-president.

The Wilmington Institute Free Library, Wilmington, Del., has for several years been developing its department of applied science and is now anxious to obtain a full line of trade catalogs published by the various manufacturing concerns throughout the country. Any trade catalog will be of value to this collection and will be appreciated.

The American Electric Railway Manufacturers' Association, George Keegan, secretary, announces the opening of an office at 165 Broadway, New York City. This office will be the headquarters of the association, and out of town members are invited to use the rooms for the receipt of their mail and for carrying on correspondence, while in the city.

W. R. Hulbert, manager of sales for the Goldschmidt Thermit Company, New York, lectured on the Thermit-welding process before the Cleveland (Ohio) branch of the American Chemical Society, at its March meeting. In addition to a general description of the process and its various applications, with lantern slides, Mr. Hulbert gave a demonstration of Thermit welding, comprising a number of experiments to show how the process is used commercially for repairing wrought iron and steel sections, and for welding pipes up to 4 in. in diameter.

The gross sales of the Western Electric Company, Chicago, for February were not only 20 per cent. larger than the corresponding month in 1910, but established a record for February business. In January the making up of returns for last year may have thrown some of the business into February which otherwise would have come into the January sales-returns, but that will not account for the entire increase. On the basis of two months for which reports have been received, gross sales for the year should be about \$71,000,000. This would exceed by \$2,000,000 the previous high record of 1906. Western Electric's sales for twelve years, if the present year turns out as indicated, will total well over half a billion dollars. Favorable weather conditions in the west and southwest point to a good demand for telephone equipment from agricultural districts this year, and the company is well prepared for the expected enlargement in sales. At present there are 24,000 persons in the company's employ.

Judge Rellstab in the United States circuit court for New Jersey recently rendered a decision in a suit brought by the National Malleable Castings Company against the American Steel Foundries, holding that the patents owned by the National Malleable Castings Company on the Climax coupler are valid and are being infringed by the American Steel Foundries. The infringement, he held, consists in the manufacture and sale of locks intended for repair purposes with the Climax coupler. A final decree has been entered for the complainant. The case is reported in 182 Fed. Rep., page 26. The decision will prevent the further making and sale of repair parts for a patented coupler by others than the original maker. The American Steel Foundries has issued a statement saying that in consequence of this decision it can no longer lawfully furnish for repair purposes knuckles, locks, etc., for patented couplers, except those the patents for which it owns itself, whether these parts are themselves subject to separate patents or are simply parts of a general coupler patent.

TRADE PUBLICATIONS.

Friction Clutches.—The Carlyle Johnson Machinery Co., Manchester, Conn., has devoted catalog E to the descriptions and advantages of its friction clutches. This catalog is illustrated, contains 35 pages and includes dimension tables and the latest price lists.

Side and Center Bearings.—Edwin S. Wood & Co., Chicago, have published a 45-page booklet describing the Woods side and center bearings, and giving some valuable data on the general subject of rollers under load, concerning which there is little reliable information in print.

Track Jacks.—Templeton, Kenly & Company, Ltd., Chicago, have prepared a special catalog, No. 12, on Simplex track jacks, for the use of officers of seven western railways, including the Southern Pacific, the Union Pacific and the San Pedro, Los Angeles & Salt Lake. The booklet lists four types of track and car jacks, giving full information concerning each.

RAILWAY STRUCTURES.

BRONXVILLE, N. Y.—The New York Public Service Commission, Second district, has decided on the plans for the elimination of the grade crossings on the Harlem division of the New York Central & Hudson River in Bronxville, made necessary by the electrification of that road. The plan adopted provides for the construction of an undergrade crossing, 50 ft. wide, at about the location of the present station. The cost will be about \$150,000. The commission has also ordered the elimination of the Main street grade crossing in Irvington. An overhead crossing is to be built about 300 ft. north of the present grade crossing and a subway for pedestrians is to be constructed about on the line of the present Main street crossing. The total cost of this improvement will be about \$80,000.

BURLINGTON, VT.—An officer of the Central Vermont writes that the question of building a new station at Burlington is now under consideration, but no definite plans have yet been made to carry out the work. (March 3, p. 436.)

COUNCIL BLUFFS, IOWA.—The Chicago, Rock Island & Pacific transfer elevator at Sixteenth street and Twelfth avenue was burned on March 8, the loss including eight box cars.

DOAKTOWN, N. B.—See Marysville, N. B.

EVERETT, WASH.—The Seattle & Everett Railroad and the Everett Railway, Light & Water Company will jointly build a passenger station at Everett, for which bids are now being asked. The cost of the improvement will be about \$60,000.

IRVINGTON, N. Y.—See Bronxville, N. Y.

LONDON, ONT.—Bids are wanted up to noon, March 25, by A. L. Hertzberg, division engineer of the Canadian Pacific, at Toronto, for constructing a 22-stall engine house, also a boiler and machine shop at London.

KANSAS CITY, MO.—The Union Pacific has given a contract to the Foundation Construction Company, New York City, for rebuilding its bridge over the Kaw river to conform to the plans of the Kaw Valley Drainage Board.

MARYSVILLE, N. B.—The Intercolonial will put up a new steel bridge, it is said, over the Nashwaak river above Marysville; also a steel bridge near Doaktown.

MEMPHIS, TENN.—According to press reports, the Nashville, Chattanooga & St. Louis will spend a large amount of money for terminal improvements at Memphis. The work includes putting up a freight warehouse and enlarging the roundhouse.

PORT ARTHUR, TEXAS.—The Southern Pacific has let a contract to McKnight & Co., Beaumont, Texas, for building a brick passenger station 88 ft. x 38 ft., to cost about \$20,000.

TUSCALOOSA, ALA.—See Tuscaloosa Mineral under Railway Construction.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The *Pennsylvania Lines West* are said to be considering an order for 2 locomotives.

The *Atlantic Coast Line*, mentioned in the *Railway Age Gazette* of March 10 as having ordered 29 locomotives from the Baldwin Locomotive Works, is still negotiating with this company. No contract has been consummated.

The *Solvay Process Company*, Syracuse, N. Y., has ordered 1 six-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 19 in. x 24 in., the diameter of the driving wheels will be 51 in., and the total weight in working order will be 122,000 lbs.

The *Bingham & Garfield*, as mentioned in the *Railway Age Gazette* of March 3, has ordered 1 Mallet locomotive from the American Locomotive Company. The dimensions of the cylinders will be 26 in. and 41 in. x 28 in., the diameter of the driving wheels will be 51 in., and the total weight in working order will be 454,000 lbs.

CAR BUILDING.

The *St. Louis & San Francisco* is in the market for 11 postal cars.

The *San Diego & Arizona* is in the market for 30 forty-ton box cars and 90 fifty-ton flat cars.

The *San Antonio & Aransas Pass* is in the market for a number of box cars and stock cars.

The *Kansas City Southern* is in the market for 125 ballast cars, two tseam shovels, one ditcher, one wrecking crane and one pile driver.

The *New York, Westchester & Boston* has ordered 30 seventy-two-foot all steel passenger cars from the Pressed Steel Car Company.

The *Chicago, Rock Island & Pacific*, mentioned in the *Railway Age Gazette* of March 10 in an unconfirmed item as being in the market for 1,450 freight cars, is not in the market for any freight equipment.

IRON AND STEEL.

The *Grand Trunk* has ordered 65,000 tons of rails.

The *Pere Marquette* has ordered 20,000 tons of rails.

The *Canadian Northern* has ordered 75,000 tons of rails.

The *Chicago & Western Indiana* has ordered 1,000 tons of rails.

The *New York, Chicago & St. Louis* has ordered 5,000 tons of rails.

The *Chicago, Milwaukee & St. Paul* has ordered 390 tons of structural steel for a viaduct.

The *Atlantic Coast Line* has ordered 1,750 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The *New York, Westchester & Boston* has ordered 5,600 tons of rails from the Pennsylvania Steel Company.

The *Vicksburg, Shreveport & Pacific* has ordered 1,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The *St. Louis & San Francisco* is said to have ordered 3,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The *Lake Shore & Michigan Southern* has ordered 1,800 tons of structural steel for six bridges, the order being divided between the American Bridge Company, the King Bridge Company and the McClintic-Marshall Construction Company.

General Conditions in Steel.—Since the first of the month there has been a slight falling off in orders, but the steel men feel that the lull is only temporary and are confident that conditions will show a marked improvement very soon. Prices have held in spite of this decrease and no reduction is expected at the conference of steel manufacturers to be held in New York this week. Although orders are small, inquiries are large, so a boom is predicted for the near future.

MACHINERY AND TOOLS.

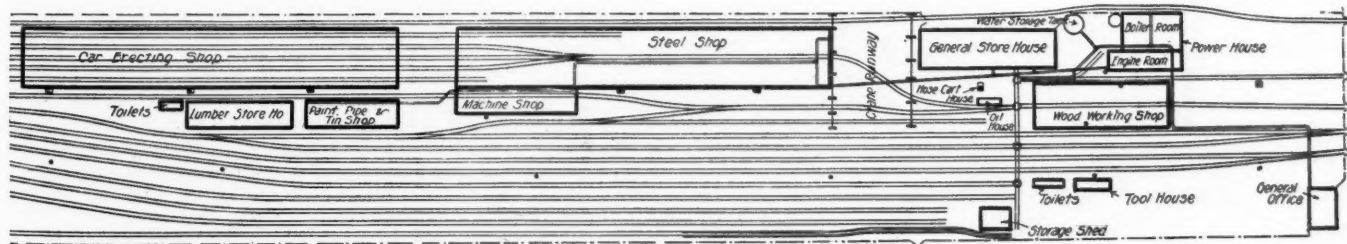
The *Union Pacific* has issued a list of machine tools calling for bids on about \$25,000 worth of machinery.

SIGNALING.

The *Alabama Great Southern* is to install automatic block signals between Tuscaloosa, Ala., and Moundville. The *Alabama Great Southern* is now equipped with automatic block signals as follows: Wauhatchie to Batelle, 28 miles; Woodstock to Tuscaloosa, 26 miles; and Livingston to Meridian, 36 miles. The completion of the 17 miles just authorized will give 107 miles protected by automatic block signals, or about 36 per cent. of the entire mileage of the road. It is the intention of the officers to ultimately equip the entire line from Chattanooga to Meridian with automatic block signals. The northern section of the *Queen & Crescent Route*—the Cincinnati, New Orleans & Texas Pacific, Cincinnati to Chattanooga—has long been thus equipped.

The Whipple Car Shops.

The Whipple Car Company occupies the plant that replaced the old car shops of the Chicago, New York & Boston Refrigerator Company, which were burned in 1907. The original plant was used to repair the refrigerator cars of the New York Despatch and the National Despatch lines, but the new one was built with the intention of entering the field of car construction. Since its opening the company has built a large number of refrigerator cars for the Baltimore & Ohio, about 5,000 new underframes for the Santa Fe, and quite a number of steel underframes for tank cars, as well as keeping up the repairs on the cars of the refrigerator lines, as in former years. These shops extend from Fifty-first street to Fifty-fourth street, Chicago, directly west of St. Louis avenue, and are near the Elsdon yards of the Grand Trunk. They also have connections with railways entering Chicago by means of the Belt railway and the Baltimore & Ohio Chicago terminal. Referring to the plan, the first building to the left is the wood car erecting shop, which has a capacity of 50 cars on the five tracks extending the full length of the shop. This building is 80 ft. x 500 ft., and is of steel



Whipple Car Shops.

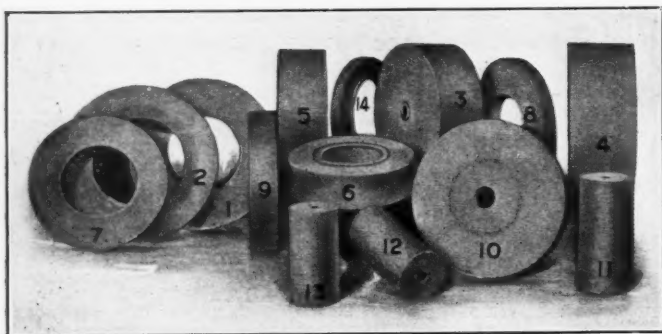
construction. The sides and ends are covered with galvanized iron and the doorways with the Kinnear roller curtains. At the side of this shop there is a small brick building which includes the paint shop, pipe and tin shop.

The steel erecting shop is 80 ft. x 500 ft., and is of similar construction to the wood car erecting shop, except that it is provided with a 7½-ton Niles crane, which has a span of 78 ft. The scaffold platforms in this shop are supported from the roof trusses leaving the floor space free. A brick lean-to, 35 ft. x 160 ft., is used as a machine shop, and is equipped with axle lathes, wheel boring mills and wheel presses, all of which are made by the Niles-Bement-Pond Company and are motor-driven. This shop is spanned by a 1-ton Sprague traveling crane, the operation of which is controlled from the floor by the use of pendants. The planing mill is a brick structure 60 ft. x 180 ft., and a small portion at one end has a second story which is occupied as a pattern shop. The planing mill is equipped with sufficient wood working tools of modern designs to finish material for 25 new cars per day in addition to the usual amount of repair work required. These tools are also motor-driven.

The power house is arranged in three divisions: two used for the boilers make a structure 50 ft. x 80 ft.; and the engine house is 50 ft. x 100 ft. There are seven horizontal boilers which have a total capacity of 840 h. p. The brick chimney is 125 ft. high, 5 ft. in diameter at the top and 7 ft. at the bottom. The engine room is lined with white enamel tile, and is equipped with three direct connected d. c. generators to engines having a total capacity of 570 h. p. There is also one small spare generator of 6 k.w. capacity for emergency lighting, a Franklin air compressor with a capacity of 420 cu. ft., and an Ingersoll-Rand compressor of 740 cu. ft. capacity; also one fire pump with a capacity of 100,000 gal. per min., at a pressure of 100 lbs. The storehouse, 50 ft. x 180 ft., is of brick and steel construction; between it and the steel erecting shop is a 5-ton Niles traveling crane having a span of 100 ft. The space which this traverses is used for the storage of heavy material, which may be handled by the crane to the shops or to the cars either in receiving or shipping. The office is a brick building, 38 ft. x 54 ft., two stories high. The first story is occupied by the general superintendent and his clerks, and the second contains a drafting room, dining room and kitchen. The president of the Whipple Car Company is Walter W. Whipple, and the superintendent of shops is George T. Anderson. The Chicago office of the company is in the Commercial National Bank building.

Vitrified Grinding Wheels.

A group of unusual grinding wheels made by the Carborundum Company, Niagara Falls, N. Y., is shown in the accompanying illustration. The largest is the one numbered 2. It is 48 in. in diameter and is said to be the largest vitrified grinding wheel ever made. It is made of Aloxite, the new steel grinding



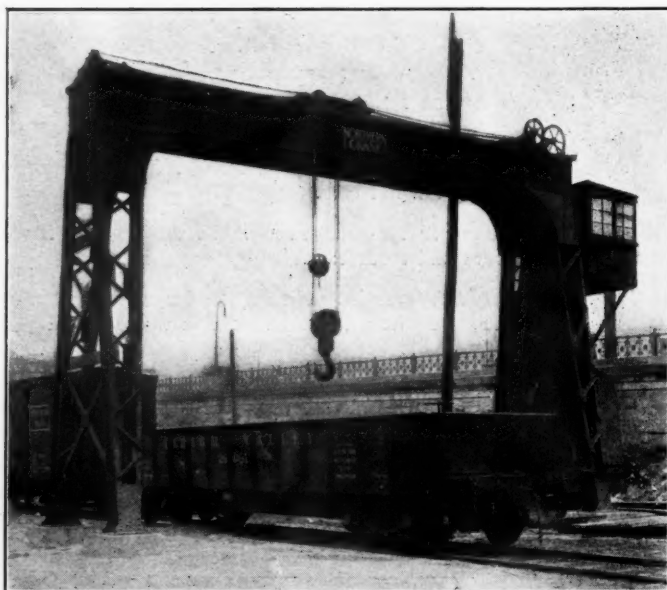
Vitrified Grinding Wheels.

abrasive recently put on the market by this company, and is to be used for tool grinding by one of their customers in France. This group shows wheels used for a variety of purposes. No. 1, made of silicate Aloxite, is 48 in. in diameter by 3 in. thick, and is to be used for grinding cutlery steel. Nos. 3 and 4 are drums, 39¼ in. in diameter by 16⅞ in. thick, and are to be used for hulling grain. No. 5, made of silicate Aloxite, is 40 in. in diameter by 14 in. thick and is to be used to grind mower sections. No. 6, made of vitrified Aloxite, is 36 in. in diameter by 9 in.

thick, and is used for pointing cast steel wire. No. 7, made of silicate Aloxite, is 39 in. in diameter by 3 in. thick, and is to be used in glass grinding. No. 8, made of vitrified Aloxite, is 36 in. in diameter by 4 in. thick and is to be used in grinding angle iron. No. 9, of silicate Aloxite, is 40 in. in diameter by 4 in. thick and is to be used in grinding corset steel. No. 10 is 40 in. in diameter by 8 in. thick, and is to be used in grinding structural steel. No. 14, made of silicate Aloxite, is 36 in. in diameter by 4 in. thick, and is to be used for tool grinding. The other three, made of vitrified carborundum, are 12 in. in diameter by 26 in. long and are to be used to grind vitrified tile. The net weight of this group of wheels is 8,350 lbs. The Carborundum Company not only has a ready supply of regular or standard shapes and sizes, but can supply any special shapes and sizes.

Thirty-Ton Hoisting Crane.

A 30-ton crane built by the Northern Engineering Works, Detroit, Mich., is shown in the accompanying illustration. The crane has a main hoist of 30 tons capacity and an auxiliary hoist of five tons capacity, the latter being for high speed service. A separate hoisting mechanism is provided for each hoist. The crane differs somewhat from the usual design in that all the hoisting machinery is located on the end post and is so ar-



30-Ton Crane for Loading and Unloading Cars.

ranged that in emergencies it can be operated by hand power. All controlling apparatus is located in the upper cab shown on the extreme right. The housing for the hoisting mechanism is shown just below the cab. This crane is now in service in the Lehigh Valley yards in New York City, being used for transferring freight from wagon to car and from car to wagon. The machinery is motor operated, the motors receiving power from an alternating current circuit.

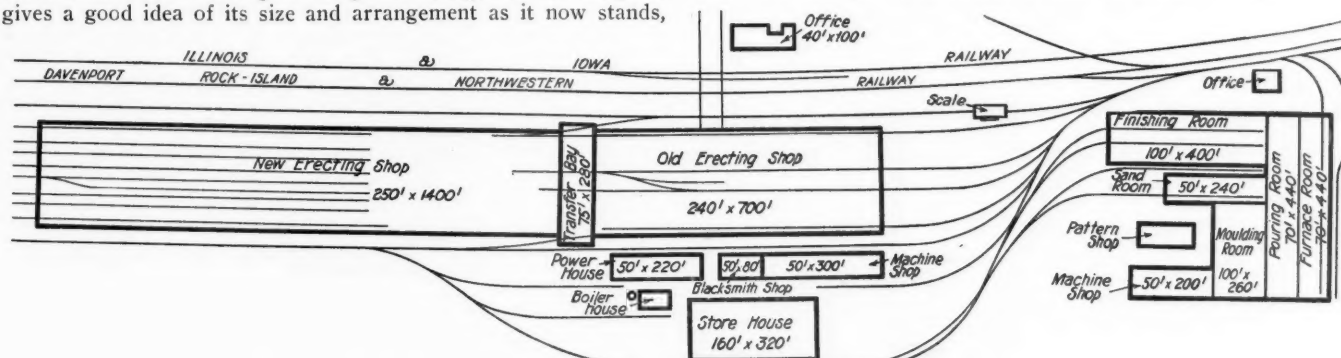
FOREIGN RAILWAY NOTES.

The minister of transportation and public works of Brazil has approved the plans for the extension of the Goyaz Railway from Ipamory to Antas, a distance of 159 miles, the first-named station being 122 miles above the initial station of the road. In another order further plans for the extension of the same railway from Perdicao to Palestina have been given final approval. This section of the line is to be 263 miles in length and will cost \$2,100,000 to build, according to specifications now accepted.

The minister of industries and public works of Chile has approved the final plans for the construction of a railway from Cajon to Llaima. The distance to be covered by this line will be 28 miles.

New Bettendorf Steel Car Plant.

The steel car plant at Bettendorf, Iowa, which was built in 1902, was described in the *Railway Age Gazette* of October 16, 1908. In the past two years it has been enlarged to such an extent that the plant of 1908 is only a small corner of the present one. The original tract for the old plant covered 40 acres, while the factory grounds now cover an area of 100 acres, and the buildings have an aggregate area of 800,000 sq. ft., or 18 acres under roof. The drawing showing the arrangement of the plant gives a good idea of its size and arrangement as it now stands,

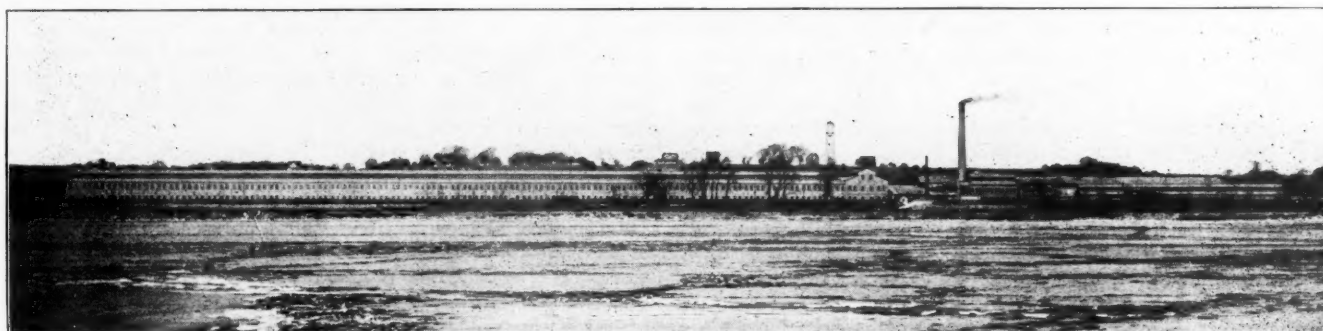
**New Car Shop and Steel Foundry; Bettendorf Axle Company.**

and the photographic views serve to illustrate to some extent the character of the buildings and some of the equipment.

The original shop is a brick structure 700 ft. x 240 ft., and in the recent improvements there has been added to it a main fabricating and erecting shop 1,400 ft. x 255 ft. x 60 ft. high, which is of steel frame and brick construction, thus making one building 2,100 ft. x 255 ft. In addition to this there has been erected, a 540 ft. x 440 ft. steel foundry arranged with wings on the bays. This set of buildings covers 160,000 sq. ft. and lies directly east of the main shop. The engine and pump house, located south of the main shop, is 220 ft. x 50 ft. The boiler

direct-connected to a 500-k.w. direct-current generator, as described in the *Railway Age Gazette* of March 3, and from two tandem compound engines each direct-connected to a 100-k. w. direct-current generator. There are also generator and dynamo sets for lighting the streets and homes in the town of Bettendorf. From the power plant extends a large 1,263 ft. concrete tunnel carrying the hydraulic, air power lines and the electric conductors to the foundry. Another tunnel carries the hydraulic, air and oil lines to the main shop where they are placed overhead and tapped at the various presses and machines.

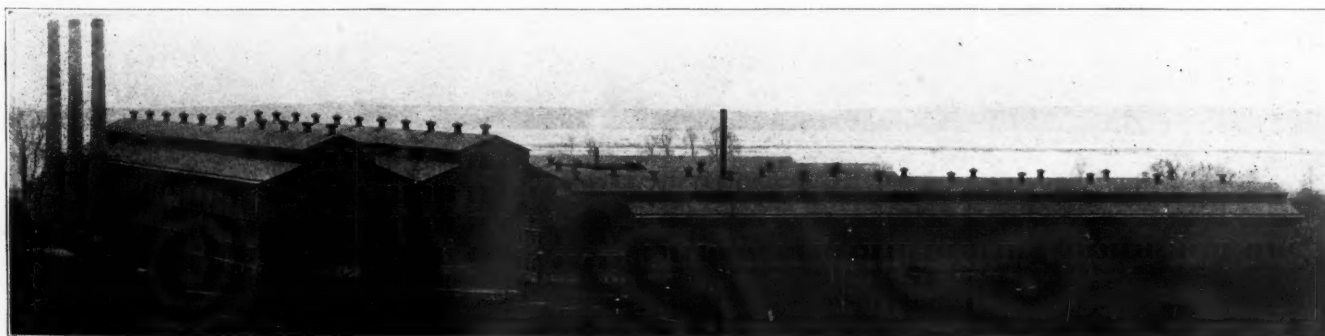
The main shop in which the underframes and cars are made

**New Bettendorf Steel Car Plant; Bettendorf, Iowa.**

house is 80 ft. x 50 ft., and is located directly south of the engine and pump house. East of the engine room is the machine shops, 380 ft. x 50 ft., and the storehouse, 320 ft. x 160 ft.

The boiler house is equipped with four vertical water tube boilers, and two more may be added to meet the demands of the growing business. These boilers are equipped with automatic chain grate stokers, economizer and a conveying equipment, with automatic coal weighing hoppers, that will handle the coal and ashes. The engine house contains two duplex fire pumps having

is equipped with 15 electric traveling cranes of 3 to 10-ton capacity, having approximately 60 ft. and 70 ft. spans. The old part of this building, or the original shop, is divided into five bays, the two south bays being devoted to the manufacture of bolsters and the two north bays for the manufacture of small car parts and truck spring plants. One end of the center bay is used principally for storage and the other end for the assembling and manufacture of underframes. At this end of the center bay and connecting it to the new addition is a transfer bay equipped

**Bettendorf Steel Foundry.**

with necessary appliances (cranes, magnets, etc.) for distributing material from the old shop to the four bays of the new addition. The two north bays in the new addition are used for the fabrication and erection of underframes and steel cars. The south center bay is used for the application of floors and sides to the underframes and the south bay for the storage of small car parts and specialties. There are 39 hydraulic presses in this shop, ranging in capacity from 50 to 2,500 tons, which were especially designed and built by the Bettendorf Axle Company to meet the requirements of the Bettendorf construction. Near the center of the two north bays are located a series of subways

are 45,000 now in use, are made in this shop; all have their longitudinal sills continuous from end to end. They are made from commercial rolled shapes and have attached to them the draft sills in which the necessary draft gear stops, lugs and pockets are cast integral. This gives better alinement and eliminates the possibility of shearing draft gear stop rivets. These underframes have also continuous end sills body bolsters and needle beams which pass directly through the center sills transmitting the load on the cross members directly to the center sills and from member to member without depending on the medium of rivets and gussets to sustain the load. Rivets



Painting and Loading Department for Steel Underframes; Bettendorf Steel Car Shop.

for assembling and riveting the underframes which is done by means of compression gap riveters, above which are located electric or air hoists suspended from small overhead cranes or trolleys for handling the heavy sills, etc. Numerous Bettendorf low pressure air furnaces are used to heat the rivets and other materials requiring hot shaping. Running through this shop longitudinally are eight standard gage tracks connecting with the various yard tracks. Two locomotives and three locomotive cranes are used for transportation of material over the tracks at this plant, which have a total length of eight miles. The heating of the shop is supplied by the Evan-Almiral hot water system, having 75,000 sq. ft. of radiation, which is found to comfortably warm this large shop.

The Bettendorf underframes for freight cars, of which there

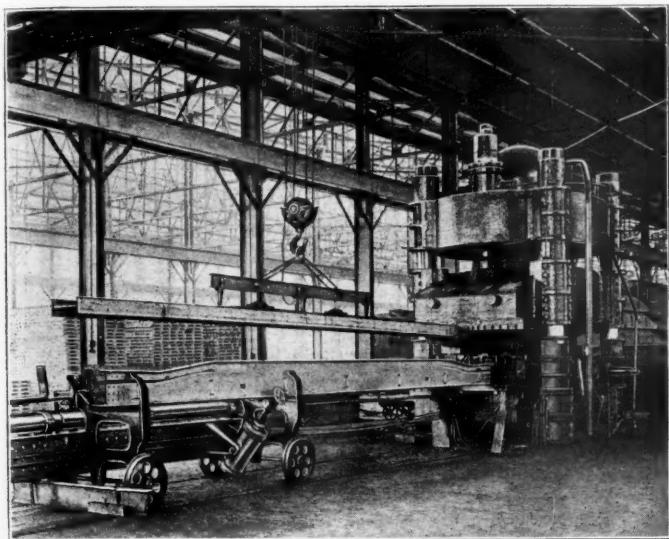
are 45,000 now in use, are made in this shop; all have their longitudinal sills continuous from end to end. They are made from commercial rolled shapes and have attached to them the draft sills in which the necessary draft gear stops, lugs and pockets are cast integral. This gives better alinement and eliminates the possibility of shearing draft gear stop rivets. These underframes have also continuous end sills body bolsters and needle beams which pass directly through the center sills transmitting the load on the cross members directly to the center sills and from member to member without depending on the medium of rivets and gussets to sustain the load. Rivets



One Half Erecting Bay; Bettendorf Steel Car Shop.

to furnish either the built-up bolster or those made of cast steel.

Aside from the specialties described above, this concern is gradually drifting into the manufacture of cars in their entirety. An all steel box car was built and is now being tried out in service. In each design the effort is made to eliminate most of the objections to steel superstructures which have so frequently been raised. This company has also designed several other kinds of cars for special service and is prepared to design



2500-Ton Hydraulic Press for Center Sills; Bettendorf Steel Car Shop.

and build any type of freight car demanded by the railways. Sills, etc., are shaped cold in hydraulic presses to prevent internal forging stresses and are punched and sheared in such a manner that one sill is completed in two strokes of the press, which insures perfect alinement of all holes. The necessity of drifting and reaming, to make rivet holes match, is thereby eliminated and the fractures in metal caused by drawing up are prevented. All sills are interchangeable with no variation in the spacing of holes. These sills are handled between machines by powerful lifting magnets and are fed into the presses by compressed air handling, turning and feeding trucks especially designed by the company.

The main machine shop is devoted entirely to the building and repairing of the hydraulic presses, machines and the elaborate dies used in the presses throughout the plant. It is a well equipped, up-to-date and strictly modern shop equipped with motor-driven tools, such as planers from 28 in. x 28 in. x 5 ft. single head to 48 in. x 50 in. x 20 ft., with 40 ft. bed open side, double head; lathes from 18 in. x 8 ft. to 32 ft. x 16 ft.; 2 in.

and 3 in. turret lathes; 4 ft. 6 in. to 6 ft. radial drills; 18 in. and 24 in. crank shapers; saws; and bolt cutting machines; also drill presses of various sizes. To assist in setting the work a 5 ton 49 ft. span traveling electric crane is employed. The blacksmith shop is used exclusively for making and trimming shop tools and is a well equipped modern shop with the necessary forges, hammers, press and hardening furnaces with electric pyrometers as well as a bolt and rivet heading machine. This shop is located in the machine shop building and occupies 80 ft. of the 380 ft. shop. The electrical department, which is located within the main shop, is well equipped and affords facilities for winding and baking armatures and field magnets and repairing motors.

The steel foundry, located directly east of the main shop, is a steel brick structure divided into wings or bays and designed to permit of ample enlargement. It was commenced in 1909, and the first heats were taken from the furnaces in the summer of 1910. The furnace bay, 70 ft. x 440 ft., is equipped with two 5-ton, 70 ft. span, electric traveling cranes for handling molds and castings; one 3-ton electric traveling wall crane; one 35-ton, 70-ft. span ladle crane with a 35-ton main hoist and a 5-ton auxiliary hoist and two 3-ton jib cranes for handling the furnace spouts. Through this department is a continuous sand conveyor for handling sand and conveying it to the sand mixers in the



Machine Shop; Bettendorf Steel Car Plant.

sand room. The two molding rooms, each 260 ft. x 50 ft., are equipped with two 5-ton, 48 ft. span, electric traveling cranes and miscellaneous jib cranes, pneumatic ramming tools, Bettendorf molding machines and core machines, and a continuous sand conveyor delivering sand at the various machines from the sand mixer. The sand room, 240 ft. x 50 ft., is equipped with concrete bins for sand storage, one 5-ton, 48-ft. span, electric crane with $\frac{1}{2}$ yard grab bucket, two 25-ton continuous heavy sand mixers and two 15-ton facing sand machines. The annealing and chipping rooms, arranged in two bays each 400 ft. x 50 ft., are equipped with two continuous annealing ovens of the Bet-

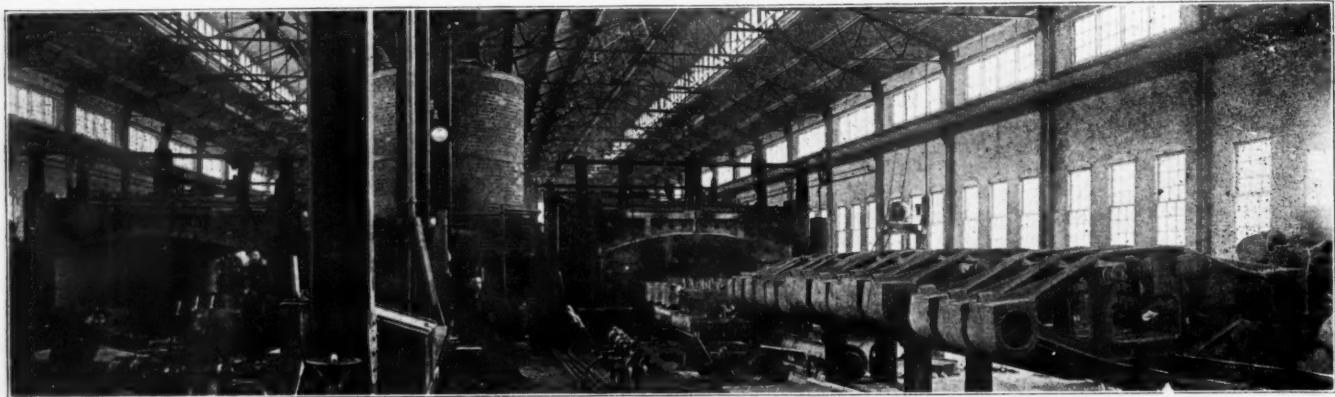


Sand Mixer and Conveyor; Bettendorf Steel Foundry.

tendorf design which greatly expedite the process and render castings of a uniform quality. A Bettendorf hydraulic press, of 775 tons capacity and specially designed for this service, is used to straighten and test truck frames to insure perfect alignment. Five ton, 48-ft. span, electric traveling cranes are used to carry castings to the various parts of these departments and for loading castings on cars.

A metal pattern and machine shop, 200 ft. x 50 ft., occupies another bay of this structure and is equipped with the necessary up-to-date motor driven tools to build and repair the metal pat-

terns of the truck together, they being tied by means of a spring plank with the pivot connections at the side frames, which renders the truck free to adjust itself to track irregularities. There are now about 250,000 of these truck frames in service, and they are guaranteed against failure by breakage. On account of their simplicity and the great reduction in the number of pieces, the cost of repairs is much less than that of the arch bar or trucks of other designs using more pieces. The Bettendorf cast steel center sill ends are also produced here and possess that peculiarity so common to the Bettendorf construc-



Annealing Furnaces; Bettendorf Steel Foundry.

terns, molding machines and other machinery used throughout the foundry. In another bay, 140 ft. x 50 ft., is the wood pattern shop on the upper floor, equipped with motor driven, automatic start and stop planer, joiner, pattern grinder, saw tables, band saw, lathe, and revolving oil stone. On the ground floor of this building is a well arranged locker room, lavatory and swimming pool for the convenience of the employees.

In this foundry are produced the Bettendorf one-piece cast steel truck frames, with the arch bars, columns and journal boxes cast into one piece, thereby producing a truck having a low cost of maintenance, light weight due to reduction in number of parts, great strength, and flexibility due to the method of tying the two

tion—reduction in the number of parts and weight, together with increased strength.

The town of Bettendorf now has a population of about 1,500 people, and is to a large extent under the control of the Bettendorf Axle Company, through a town improvement company. This company under franchises obtained from the town council has put in a system of water works to supply the town from an artesian well and a stand pipe located on a bluff. The improvement company also supplies electric light to the town and private houses, the current being obtained from the shop engine room. It has spent about \$100,000 in putting in the water and lighting plants for its employees' homes.



Pouring Room in Bettendorf Steel Foundry for Truck Sides.